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(71) Applicant and

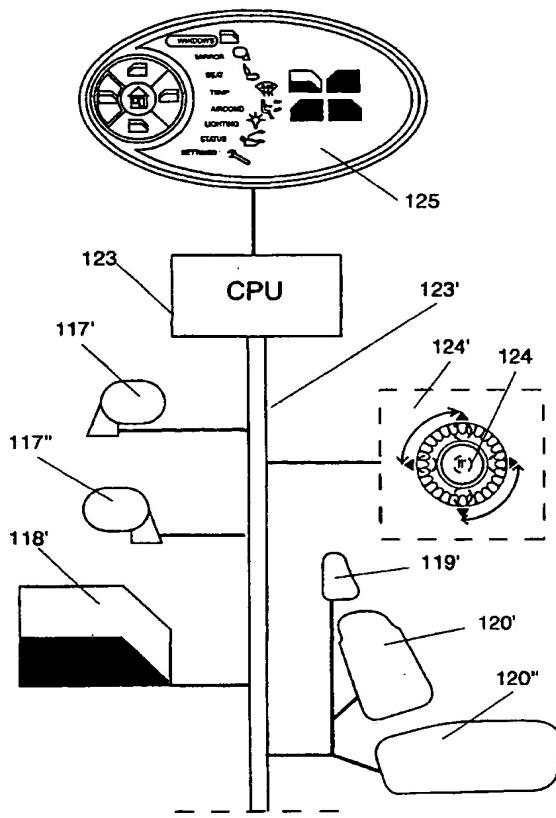
(72) Inventor: BADARNEH, Ziad [NO/NO]; Carl Kjelsens
vei 34, N-0874 Oslo (NO).

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(54) Title: INTERACTIVE SYSTEM



(57) Abstract: A multifunctional switch device (124) is used with electronic equipment (123, 123', 124') for, e.g., adjusting functions in a vehicle, for example, seat (119', 120', 121'), mirrors (117', 117''), windows (118'), speed, ventilation, lights etc. A central processing unit (123) controls the individual adjustments of equipment, and a data bus (123') provides an exchange of information both ways between the central processing unit and the functional equipment. All components connected to the data bus will contain data related to identity and functionality. A display (125) is connected directly to the central processing unit (123), whilst the switch device (124) is connected to the data bus (123') via a suitable interface (124'). To facilitate use of the switch device (124) an animation thereof is shown on the display (125).

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERACTIVE SYSTEM

The present application relates to an interactive system for use in electronic equipment, and more particularly it relates to a system that is described in the preambles of attached 5 claims 1 - 6, and to a use of the system as disclosed in claim 43.

International Application PCT/NO00/00412 relates to an interactive system adapted for use in electronic equipment, and in particular with the interactive use of different types of multifunction switches for electronic apparatus such as those in vehicles.

10 The following is a further development of this system and gives some concrete examples of the use of the inventor's multifunction switches in *inter alia* a car. International Application PCT/NO01/00056 teaches the use of switches that are, for instance, mounted on a steering wheel. The combination of a movable switch and 15 interactive display functions is taught. The application focuses in particular on a switch having three press functions, and on the combination of two switches. A sliding switch having four pressure positions is also taught.

In the present invention the function of rotating multifunction switches will be further 20 taught in connection with functions in a vehicle. Focus will be centred on the use of rotatable switches having five pressure points or action points. Such switches have not been taught earlier in connection with use in means of transport such as vehicles, boats and aircraft. Elements which are found in connection with this interactive use can also be used in other mobile units such as various hand-held apparatus, for example, 25 telephones, mobile telephones, PDAs, mini-computers (PCs), multicomunicators, photographic and film equipment, radios, access and control equipment, fault localisation and analysis equipment, music systems, and remote control for all types of apparatus and functions.

30 However, other types of multifunction switches are also possible and are described in the form of preferred examples.

The object of the present invention is to be able to use switches and switch assemblies which do not have fixed marking, such as marking applied by silk screen printing. This 35 means that all information needed by the user will have to be shown in another expedient manner, such as on a display means. In other words, the object is that the switch should be capable of functioning interactively with a menu system shown on a

display screen, for example, an LCD screen. However, it is an objective that the information shown on the screen should be easy for the user to understand, according to the physical design the switch device has.

- 5 It should be noted that switches can be fixedly mounted in a vehicle, such as on the steering wheel, levers, the centre console, side panels, doors or the like, or function as a hand-held apparatus, as for instance a remote control unit. In a vehicle, the display unit can be placed, for example, in connection with the dashboard in the car, or in the vicinity thereof, so that the driver can easily see the display whilst driving, without
- 10 being distracted from constantly assessing the traffic situation. Of course, in another variant the information can be projected onto the windscreen, as is known from *inter alia* fighter planes. For use by persons other than the vehicle driver, it would be possible to place a display in a centre console in the front of the car, or immediately in front of a passenger. An alternative location could be in the back of the front seats for
- 15 use by back seat passengers, or in the roof, and then optionally as a folding or hinged solution.

To summarise, the invention therefore relates in principle to the use of a stepwise rotatable, multifunctional switch and switch assembly having three to five depression positions in connection with the use in hand-held electronic apparatus and/or means of transport which have or are connected to display units for function control. The functions and possible presses of the switch are displayed on a display as they are oriented in the switch, and the function of the switch changes according to the functional requirement that the user may wish to choose in a menu shown on the display in order to perform the tasks that the apparatus and/or means of transport make available. However, it is possible to envisage the use of the multifunctional switch with a stepwise movable, sliding control element, where the control element has a plurality of depression points for activation of a respective switch function. It is also possible to envisage a variant which includes a touch screen for simulation of a multifunctional switch.

An important aspect of the invention will therefore be that the visualisation of the switch device shown to the user is simple to understand and easy to handle when effecting manipulation of the switch.

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The part of the description that relates to Figs. 1 - 34 and associated claims 1 - 5, claim 6 (features b - e), claims 7 - 28, 43 and 44 is related to the Applicant's priority

application, Norwegian Patent Application No. 2001 4796, and the part of the description relating to the other figures, Figs. 35 - 67 with associated claim 6 (features a, f, g and h) and claims 29 - 42 are related to the Applicant's priority application, Norwegian Patent Application No. 2002 0896. What is illustrated and described is
5 collectively to be regarded as only exemplary embodiments and should by no means be understood as defining the limits of the scope of the invention.

The characteristic features of the invention are set forth in attached independent patent claims 1 - 6 and 43, the subsidiary claims associated therewith, and in the following
10 description with reference to the attached drawings.

The following figures will describe the idea relating to the use of rotary or sliding multifunction switches in connection with their use in vehicles. Anyone of ordinary skill in the art will see that the system can be used in all forms of electronic equipment
15 associated with display functions.

Fig. 1 shows how presentation on a display is envisaged in principle.

Figs. 2a - 2c show a rotary switch that is used for this system.

20 Fig. 3 shows a variant of a display.
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Figs. 4a - 4d show alternative forms of displays.

25 Fig. 5 shows an alternative location of displays and switches in the interior/cab of a vehicle.

Fig. 6 shows a typical start configuration of a display with icons for the different main functions.

30 Fig. 7 shows the display of selected car functions, in this case the functions "open" and "close" windows.

Figs. 8a - 8b show selected mirror function.

35 Figs. 9a - 9b show a selected function for seat adjustment.

Fig. 10 shows a selected function for setting the temperature.

Fig. 11 shows a selected function for air conditioning.

- 5 Figs. 12a - 12c show the selection of the function for and control of GPS (Global Positioning System).

Figs. 13a - 13d show the input of a place name in connection with navigation.

- 10 Fig. 14 shows the situation on the display in connection with an incoming telephone call.

Figs. 15a - 15c show selection of the telephone function and use thereof.

- 15 Figs. 16a - 16b show selection of audio functions and the use thereof.

Figs. 17a - 17d show the basic function of a roller switch having three pressure points or action points.

- 20 Figs. 18a - 18c show functions of a roller switch on a display.

Figs. 19a - 19b show additional functions of a roller switch on a display.

- 25 Fig. 20 shows how presentation on a display is envisaged in principle in connection with the use of a roller switch in interaction with two pressure switches.

Figs. 21a - 21b show roller switches with associated pressure switches.

- 30 Figs. 22a - 22b show a menu and selection of a function in a car, e.g., control of windows.

Figs. 23a - 23b show a menu and selection of a function for the adjustment of mirrors.

Figs. 24a - 24b show which functions are controlled by a rotary switch.

Figs. 25a - 25c show an alternative display of roller switch functions.

Figs. 26a - 26e show short cuts in important functions related to a driving situation in, e.g., a car.

5 Figs. 27a - 27c show menu images in connection with a warning of late arrival at a destination and measures in this connection.

Figs. 28a - 28b show menu images in connection with indication of activation

Fig. 29a is a schematic connection diagram to illustrate the system.

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Fig. 29b shows a variant of the connection diagram shown in Fig. 29a.

Figs. 30a and 30b show the system used on a steering wheel structure.

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Figs. 30c and 30d show a variant of the solution depicted in Figs. 30a and 30b.

Figs. 31a and 31b show a menu image where the start-up of the system is related to the use of identity designation and password.

20

Figs. 32a - 32d show the system used with a tiltable/depressible sliding switch.

Figs. 33a - 33c show the use of a tiltable/depressible sliding switch in connection with the control of functions in a vehicle.

25

Fig. 34 shows the use of the system according to the invention in connection with a touch screen.

Fig. 35 shows the division of the screen image on a display screen.

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Fig. 36 shows a screen image in a "normal" drive mode for a vehicle.

Figs. 37a and 37b show typical screen images of a main menu.

Fig. 38 shows a screen image for automatic speed control ("cruise control").

35

Figs. 39a - 39f show screen images related to navigation.

Fig. 40 shows a screen image for speed limit warning.

Figs. 41a - 41g show screen images for a telephone function.

- 5 Fig. 42 shows a screen image for MP3 players.

Fig. 43 shows a screen image for audio functions.

Fig. 44 shows a screen image for a trip computer.

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Fig. 45 shows a screen image for the setting of time.

Figs. 46a and 46b are schematic illustrations of a direct drive menu.

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Figs. 47a - 47c show the screen image for a direct drive menu.

Figs. 48a and 48b show a screen image in connection with that shown, for example, in Figs. 18a and 19a.

20

Fig. 49 shows switches for operating the system corresponding to the switch in Fig. 2b.

Fig. 50 is a schematic illustration of the connection between the multifunction switch in Figure 49 and a pointer.

25

Figures 51a - 51d show a basic layout in connection with a display.

Figures 52a and 52b show the selection from a known new layout, as shown in Figure 8b with the setting of mirror function.

30

Figures 53a - 53xx show the system with the use of five-press multifunction switches.

Figures 54a - 54h show the system and the use of five-press multifunction switches, e.g., in a car.

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Figures 55a - 55b show an example of a part of the dashboard in a car in connection with the use of the system shown in Figs. 53 and 54.

Figures 56 - 58 show roller and rotary switches which individually, together with a five-way switch as shown in Fig. 59, can operate the system.

Figures 60 - 67 show different switch solutions capable of use with the system
5 according to the invention.

Figure 60 shows a roller switch with three depression points which corresponds to the switch shown in Fig. 17b, and Fig. 61 shows a variant of the solution shown in Fig. 17d and Figure 60.

10

Figure 62 shows a multifunction switch as indicated in Figure 17c, and Figure 63 shows a variant thereof, as also shown in Fig. 17d, for operating the system shown in connection with Figures 35 - 55.

15 Figure 64 shows a multifunction switch like the one shown in Fig. 2a, and Figure 65 shows a modification of the multifunction switch.

20 Figure 66 shows a multifunction switch as shown in Fig. 2b, and Figure 67 shows a variant thereof like the embodiment shown in Figure 2c, for operating the system described in connection with Figures 35 - 55.

The invention will now be described in more detail in connection with the figures and also in connection with the attached patent claims.

25 A multifunction switch as shown *inter alia* in Fig. 2 has five pressure points or action points and it is rotatably mounted more or less flush with the underlying surface. The structure of the switch and a number of areas of use that are not described in this application have been described in some of the Applicant's earlier patent applications. The actual rotary switch 5 may be constructed having a whole, uniform surface (cf. Fig. 30 2a), or having an outer rotating part 7 and a smaller, depressible part 6, as shown in Fig. 2b. The switch can also have pressure switches located outside the rotating part as shown in Fig. 2c.

That shown in Fig. 1 which characterises the use is the direct switch configuration
35 which is reproduced on the display 1, and which in field 2 reproduces the user mode and also shows the functions. Field 3 shows the result that the use of the functions gives. One example may be navigation in a text field, picture or map that will be shown in

connection with the use of GPS (satellite navigation), indicated by 4. The field will also show the result of the input of letters, numbers and symbols. This is particularly relevant in connection with telephone functions and e-mail functions. The field may also show extended menus, list various items for selection and show on-line functions such as Web pages on the Internet. The screen can also be used for television and videophones.

The fields I, II, III, IV and V correspond to the pressure points I', II', III', IV' and V' on the multifunction switch. This means to say that when, for example, I' is pressed, I will be marked or will move (i.e., some form of animation which shows a depression action). The fields I, III, VI and V represent a main menu for primary functions. II represents a main function such as OK, CLEAR, BACK or HOME. II will thus change character according to the function that is selected. Once a function in field 2 and/or 3 has been selected, for example, selection of I, I - V will change character in order to reflect the sub-options the user is given when he has selected a function.

Fig. 3 shows how the functions can be distributed in fields 2 and 3 as shown in Fig. 1. Field 8 in Fig. 3 is used in those cases when it is desirable to fill the whole screen area with information, pictures, background etc. The whole area 1 (see Fig. 1) can in theory show anything at all. In a situation where the use of the switch is not desired, the area can show functions that are standard in a car, for example, speedometer, revolution counter etc. This will be particularly relevant in those cases where the display is located on the dashboard immediately in front of the driver. The field 9 shows the natural position of a menu and sub-functions thereof. Alternatively, this can be placed in a field 11. Of course, field 11 can also show on-line functions such as Internet or e-mail and function as a writing sheet for the input of text. Division of the field 8 with a dividing line which marks a field 10 will allow both text and pictures to be shown simultaneously.

30 Figs. 4a - 4d show an alternative design of an interactive display for a multifunction switch of described characters although this should not be regarded as limiting for the invention.

Fig. 5 shows an alternative location of the display and switches in a typical vehicle environment. Displays 12 and 13, 14 (projected onto the windscreens) show a suitable location where the functions are controlled by the driver. If a passenger is to be able to use the functions, a position as indicated by 15, 16 would be natural or the display could

be projected onto the windscreen. Switches 18 that are located on a steering wheel could be used by the driver. Location of switches in centre console 19 would allow the switches to also be used by a passenger. A solution is also conceivable where the switch is mounted inside a lever, e.g., a gear lever, for easy use by the driver. The reference numerals 17, 20 indicated alternative locations of the switch in a door. However, the location of the display and switches is not limiting for this system.

Fig. 6 shows the fields I - V replaced by icons which symbolise the main functions that are selected. The functions which are chosen to be placed here will be dependent upon the vehicle or means of transport in question and what functions are available. In other words, the multifunction switch could control almost any function when used with the system described here although the examples shown here should not be regarded as limiting for the invention. It should be noted that the system can be used for all electronic apparatus and is capable of functioning as a control and display means for all types of means of transport and vehicles on land, on water or in the air. In this case, the example taken is of a vehicle/private car where navigation 21, telephone 22, car functions 23, music/radio 24 and HOME 25 are shown on the display. As indicated later, the reference 25 can also be linked to a "Back" or "Clear" function.

Fig. 6 shows selected car functions as a result of depression of the switch 5 at III' and this will be highlighted (indicated here by a frame) on the display before the display image changes. A field 9 will show a menu field of the sub-functions that are available. Field 2 will shift to sub-functions, which is reflected by the first available option in field 9, in this case Windows 27, see Fig. 7. By rotating the switch 5 one way, the user can move a cursor downwards, or by changing direction of rotation of the switch 5 he can move the cursor upwards in the field. Here, the function of the windows is also shown as part 26 of the main field. When I' on the switch is pressed, the field 28 will be marked as shown, and the left-hand driver's window will be activated. The user will then be able to control the window up or down by turning the switch. This could be shown in field 26, but the driver of a car would be able to notice the position of windows as in today's cars. Of course, it is also possible to install press functions for direct activation of an open-close window function. Field 9 or 10 may consist of text and/or icons for the different functions. If it is necessary to have additional options, e.g., under the different functions as shown here, a new "menu list" could be shown in field 9. To return to the previous menu, the "Back" function is used, which will then be placed in field 2, II (see Fig. 1).

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- In Fig. 8 it is shown that when the switch 5 is turned, the cursor is moved to Mirror 28. At the same time, the icons shift for function control in field 2. As shown in Fig. 8, field 30 is selected, i.e., left-hand mirror, and the sub-fields in the field 2 shift to directional adjustment of mirrors, see Fig. 8b. A press on field I' of the switch 5 will 5 result in the marking/highlighting of the left-hand field 31 on the screen, and it will then be possible to adjust the mirror in the x axis by rotating the switch 5. For adjustment in the y axis, the user selects pressure field V' on the switch which is reflected in display sub-field 33. Sub-field 32 illustrates a zoom function which may be relevant in connection with digital mirrors, i.e., video.

10

- Figs. 9a - 9b show how the function of adjusting the seat could work according to the idea of the system. The switch is shown rotated and has thus moved the cursor to the function for seat adjustment 34. The sub-fields in the field 2 have changed and show the relevant possible adjustments of the seat, i.e., headrest, back rest and seat. Seat 35 is 15 selected and the sub-fields in field 2 are changed as shown in Fig. 9b, for height, backwards-forwards, angle and "Back". The sub-field 36 indicates a memory function where a particular setting can be stored, a standard function that is practical in a vehicle which has many drivers.
- 20 Fig. 10 shows selected temperature setting. Here, an extra window 40 will be shown for the number of degrees desired. Temperature inside the vehicle and/or outside temperature is information that it is usual to show on the dashboard in today's vehicles. In this case, an interactive system is used which shows only the information required at any given time.

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- Fig. 11 shows the selected function for air conditioning. Here, there are in reality countless possibilities, but a person of ordinary skill in this field will see that the illustrated system could be used in many variants according to a pattern that has been shown and described above.

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- The functions shown in connection with Fig. 10 and Fig. 11 can preferably be located under the same main menu, but will call for a number of sub-menus. To be able to present the greatest number of options possible in an orderly manner, this can be divided into two as shown.

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- Fig. 12 shows the selection of a GPS satellite navigation system 41 for a vehicle. This is a function which has become increasingly common, but it has been found that most

systems for using this function in a car are unduly complicated, rather inefficient and not particularly user friendly. When this function is selected, a map of the relevant area will be shown in the main field. Of course, this is dependent upon what maps are available for the area the user is to travel in. In principle, it is possible to have the
5 whole world stored and thus navigate to the relevant area by using the direction options as indicated in the sub-fields 42 and 43 together with the zoom option indicated in sub-field 44.

Selection of functions represented by sub-field 45 will enable the user to type in his
10 desired destination and/or itinerary. Fig. 12c shows how the sub-fields in 2 change to a start menu for input of letters. Here, "New" represented in sub-field 46 can be selected to return to a new input if the commenced or existing input is not desired. "Seek", represented in sub-field 47, can be selected as a search function if the user has the desired destination in the internal memory. "Save" can be selected in sub-field 48 for
15 storage in the internal memory, "OK", represented in sub-field 49, can be selected if the selected destination is desired, and "Back", represented in sub-field 50, can be selected if the display in Fig. 12b is required. In the position shown in Fig. 12c, letters cannot be entered directly without going via 46 or 47.

20 Input of letters is described in more detail in connection with Fig. 13, and reference will first be made to Fig. 13a. To be able to enter letters, the user must rotate the switch and a field 51' moves across a displayed field 54 and 54' containing letters and signs respectively. Field 2 is changed correspondingly so that three of the letters or symbols over which the field 51' moves can be selected directly, whilst II is changed to "Clear"
25 in sub-field 52. "Space" is obtained by pressing on the switch's pressure point III' 53. Rotation of the switch enables the user to move the cursor field 51' in the X direction across the fields. When the user goes "past" marking 54, the field 51' moves down to field 54'. A "lock" or a distinctive function that the user can use as reference for the shift can be entered between these fields. This may be in the form of a sound and/or a
30 graphic function/warning or a "Force Feedback" function. Briefly, in connection with the described switch 5, a "Force Feedback" function would be able to actuate the rotation thereof by, for example, braking, vibrating or stopping the movement.

Fig. 13b shows field 51' moved to the letters M, N and O on rotation of the switch,
35 where the selection of O represented in sub-field 55 will appear when V' on the switch is pressed for the first letter input of, for example "Oslo". This procedure is repeated until the word is complete. In this connection, it should be noted that this input

procedure will take less time if predictive systems are implemented in connection with the input of words. In this connection, a system that guesses places on the basis of the letters entered is also conceivable. If the system guesses wrong, the user continues with the input. These are different systems which are described in the Applicant's earlier 5 patent applications and other publications, and will not be described in more detail here, but which the skilled person will understand could be used in connection with the system described above without that disclosed here limiting the invention in any way.

As shown in Fig. 13b, a field 56 will show data and the entered place choice. Fig. 13c 10 shows the destination fully entered and cursor field 51' is moved back to the start field and "OK" represented by sub-field 49 is selected by pressing on field III' on the switch 55.

Fig. 13d shows field 2 as in Fig. 12b, whilst the main field 8 contains driving 15 instructions 57 and a map 58 of the area in question.

Fig. 14 shows the situation of an incoming call in a vehicle whose navigation system is active. Field 2 changes from what it was earlier no matter what function it had before. The basic functions "Answer", indicated in sub-field 60, "Hang up", indicated in sub- 20 field 62 (on telephone call), and "Save", indicated in sub-field 63 are shown. In a situation where the GPS function is in use, the route choices could still be shown on the display. This requires that the display should be large enough like the one shown here.

Fig. 15a shows a main menu and the selection of the telephone function. As shown in 25 Fig. 15b, field 2 changes as shown in Fig. 14, but where sub-field 63 in Fig. 14 is changed to the option for the input of numbers as indicated by sub-field 66. Text/menu field 9 shows an extended telephone menu and the marking of "New" in field 67 shows that input of a new telephone number is ready. By pressing on field III' of the switch 5, which corresponds to sub-field 66, the user will obtain number selection options in the 30 field 68, and also that the numbers as marked in field 51' are shown arranged in field 2. Selection is effected in the same way as for the input of letters as described in connection with Figure 13. When a number has been entered, see Fig. 15c, the display in field 2 will change and two new commands appear as indicated by the sub-fields 71 and 72. A press on pressure field IV' of the switch 5 which is related to the sub-field 60, 35 i.e., "Connect/Ring up" will cause the field 2 to change to the image shown in Fig. 14.

In connection with the input of figures and telephone numbers, it would be natural in a system of this kind to implement a predictive system which guesses at known/most used numbers. In connection with Fig. 15, the user will be able to select "Telephone Book" by rotating the switch 5. This is a standard function where stored names and numbers 5 are stored. By going directly to this function, the user will be able to browse through a list of contact persons he has stored, or easily find the desired contact person with a minimum of keying-in in a search module in combination with a predictive system.

Referring again to Fig. 6, the main menu can be seen here, and if the user selects 10 pressure field V' on the switch, this will mean that sub-field 24 will appear and indicate "Music/Radio". Here, a new display image will be produced in field 2 and field 9 as shown in Fig. 16. Option field 9 shows the different sub-functions that are available, and which the user can choose between by rotation of the switch. The cursor will indicate the selected function. Fig. 16a shows the selected function for radio, indicated 15 by the field 80. Field 2 shows "Volume Control" in sub-field 82, "Seek function" in sub-field 83, "Sound On/Off" in sub-field 84, "Stored Stations" indicated by field 85. In field 9, by rotating the switch, the user can in addition move the cursor and activate the functions as indicated in sub-fields 87 - 91. Field 86 shows relevant information concerning the active functions, i.e., in the example in Fig. 16a: active radio station.

20 Fig. 16b shows selected CD player. Field 2 contains the functions 92 - 95. The functionality is the same as for that described above. Functions such as winding etc. are under that marked by sub-field 90.

25 As sub-functions, it is only the need for functions and function control and the imagination that sets limits. By taking that taught in this description and shown in the drawings as a basis, it will be easy for the skilled person to envisage how sub-functions such as MP3, Film/DVD, Video, Television, On-line audio and visual services might also be included.

30 The design of a multifunction switch can also, e.g., be like switch 99 shown in Figs. 17b - c, where the switch has three pressure points or action points (press in the centre and tilt to the sides) and rotation. The switch rotates in a vertical direction relative to the underlying surface. The switch is known per se from the Applicant's earlier 35 applications. Fig. 17d shows roller switch 99' where the side pressure/tilting functions have been replaced by adjacent pressure switches 99", 99"". The display 100 shows a field 102 which shows the switch and its functions distributed in the sub-fields I, II and

III and which are activated by depression of the switch at its depression points I', II' and III'. The form of the display is not important for the inventive idea, but in addition to the field 102, it also contains a main field 103 and field 105 for "menu/sub-functions" and cursor 104. Field 106 can be used as header for the function that is active.

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Fig. 18a shows how roller switch 99 with three pressure positions can be used to control functions in a car. The main menu is shown here with functions for telephony 107, car 108, satellite navigation 109 and radio/music 110.

- 10 When the switch 99 is rotated, the cursor 104 will move over the different functions. To move to a previous menu, the user can rotate the switch to move the cursor 104 to "Back" 112 and press II', or press I' directly. This is possible because I does not have any other function in this particular situation. When II' on the switch 99 is pressed, II will be marked and the selected function will be activated, here shown by sub-field 108.
- 15 In this situation III' will also activate the function. Fig. 18b shows car functions and the selection of window function 111. This in turn gives the display shown in Fig. 18c. Selection of "Windows" in sub-field 113 is effected by rotation of the switch 99 and pressure on I' will move the window down, whilst pressure on III' will move the window up.

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- Figs. 19a - b show how a telephone function can be controlled by the system. Here a field 102 is used to show active function selection for the actual operation that is underway. I shows the telephone hand set for "Ring, Ok, Yes etc ..." and III shows "Hang up". Fig. 19b shows a list, in this case a telephone list, in field 104. As this is long, i.e., so long that the display cannot show the whole list at once, the cursor 104 in such cases will be fixed. However, when the switch is rotated, the list will move and the different names/number will be marked at 104. Here, the "reverse" function "Back" will be assigned to II or III. If connection is desired, the user presses I. During the conversation volume can be adjusted by rotation of the switch 99.

25

- As can be seen from that described in connection with Figures 17 - 19, this switch solution does not have the flexibility that the system described in connection with 1-16 has. This is due to the fact that it does not have more than three pressure points and thus the user will have to go via several commands and press his way through several 35 sub-sub-menus in order to carry out the different functions.

However, it should be mentioned that a number of functions and commands can have additional functions if a "long press" (known from today's mobile telephones) and a double press (known from today's computer mouse) are included . This is not described in more detail, but are functions that a skilled person would easily see could contribute to the function of the system.

Figs. 20 and 21a - 21b show a system consisting of a roller switch which together with two pressure switches controls different functions in electronic apparatus and vehicles. This is a system which in general will give a greater flexibility than the switch 99 alone as described in connection with Figures 17 - 19. The set-up of functions and the control thereof by using the switch 99 in interaction with the additional switches 115 and 116 works in the same way as for the system with the use of the rotary switch described in connection with Figures 1 - 16. A display 100 shows field 102 which is activated by the switch during use. Field 106 shows which function is in use whilst field 103 shows the result of manipulations. This may include sub-sub-menus in 105, different information, on-line information and pictures. Field 104 is a cursor which optionally is movable.

Fig. 22a shows the display screen on which the switch 99 is in a starting position, and where the main menu and the main functions are shown distributed in field 102. A press on III' on the switch will result in the selection of car functions represented by III. A menu of the relevant functions is shown in the main field 103. On rotation, the cursor is moved over the various functions. Field 102 shifts and shows in Fig. 22b the windows that are available. A press on the switch I' will result in the activation of I. If the user then rotates the switch, he will be able to "move" the windows up or down. This can also be done by direct presses.

Figs. 23a - 23b show the system in connection with the selection of the function adjustment of mirrors; I, II, III show the different mirrors in field 102. V is a memory function. Fig. 23b shows the adjustment possibilities for the selected mirror. Field 106 has changed and shows which mirror has been selected. Selection of I or V and corresponding depression of the switch 99 at point I' or V' allows, on rotation of the switch (or pressing), vertical and horizontal adjustment of mirrors. Sub-field IV indicates the possibility of a zoom function, e.g., where mirrors are digital (i.e., video display). The selection of III and depression of the switch 99 at position III' gives the previous menu, as shown in Fig. 23a. The selection of II and depression of the switch 99 at position II' gives "Home", return to the main menu as shown in Fig. 22.

Further aspects of the invention will now be explained with reference to Figs. 24 - 26. In what follows it is taught how by using the described switches it is possible to make a system which gives direct access to functions. Figs. 24 - 26 show how this is envisaged for use in a car, but with modifications the skilled person will see how the system may 5 easily be adapted for the control of other apparatus and functions.

Figs. 24a - 24b show how the use of arrows in I - V in field 102 and field 103 makes it possible to show which function is being controlled by rotation of the switch 99. The presentation on the display shows an example of what could be a relevant active driving 10 situation. The switch 99, when first touched for rotation, will control the field 103 and the cursor field 104 can be moved up or down in the field. By pressing on the switch at the point corresponding to position III, which shifts to OK on rotation in field 103, the user can select a desired function. To shift back to the start situation in Fig. 24a, the 15 point corresponding to position II is pressed. This can also be time-controlled so that after some seconds following the use of the switch the system will automatically return to the start situation. By pressing at position II in this mode, the user will be able to go to the main menu as shown in Fig. 22.

Fig. 24b shows the selection of VOL by pressing V. The field is marked and the switch 20 99, when rotated, will control volume adjustment of a pre-activated audio function such as radio or CD player. Thus, a direct press on the switch assembly in an active drive mode, will enable the driver to gain direct access to the control of important functions. This figure shows direct access on pressing and rotation; adjustment of temperature IV, activation and adjustment of cruise control I, volume adjustment V, windscreen wipers 25 III.

The system as shown here will function optimally with the use of the switch 5 as previously shown in connection with Figures 1 - 16, but explained here in connection with Figs. 25 - 26.

30 Fig. 25a shows the main function menu for the switch 5. In Figs. 25 - 26 only six fields are indicated by the reference numeral 110 for menu/function selection, but this is not limiting for the idea of the system. The whole figure may be part of and be placed in the display 1 as shown in Figs. 1 and 3. Here, it is shown that on selection of III, 35 options will be shown in the fields 110. The cursor field 114 is controlled by rotation of the switch 5. When OK is selected, as shown in Fig. 25b, the options for control of the function will be distributed in the fields, Fig. 25c.

Figs. 26a - e show a situation for short-cuts to important functions in a driving situation. By rotating the switch 5, the user will in a first situation control the function selection of the cursor fields 110. On rotation, the field III in this situation will when the switch is 5 depressed at the point III' be changed to OK for selection of function in the fields 120. As before, if field II is used, the user here will return to the main menu options as shown in *inter alia* Fig. 25. Fig. 26b shows selection of the telephone function. Rotation of the switch 5 in this situation will automatically control volume during a telephone conversation. This will also be the case in connection with an incoming call, 10 as the display will shift the content from the previous function to an image similar to that shown in Fig. 26bc.

In a driving situation as shown in Fig. 26d, the switch will show in field 2 the functions: adjustment of temperature IV, activation and adjustment of cruise control I, volume 15 adjustment V, windscreen wipers III.

The functions are activated by pressing on the switch 5 in the relevant position and rotation of the switch controls the function in question. On rotation of the switch it is possible to operate setting of temperature, volume, vehicle speed (cruise control), 20 windscreen wiper operation. These functions should not be regarded as limiting the scope of the system.

To return to the previous function II can be pressed. The system will nevertheless be capable of being time-controlled so that the previous display situation appears.

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Fig. 26e shows the situation in connection with the adjustment of sound.

For all fields that are activated, this will be indicated in that the field selected is marked or moves, as e.g., an animated button that is depressed. This is typical for field 2 on 30 depression of the switch. Of course, an audible indication may be used in combination with the system. This will be particularly relevant for the functions used during the driving of means of transport and vessels. This may be done, for example, so that a "voice" reads out the options in a menu through which the user rotates.

35 The main point as regards this part of the invention is a short-cut menu which on direct pressure on the multifunction switch gives direct access to functions that it is important to have direct access to in a driving situation. This is done so that one press allows

- different functions to be controlled on rotation of the switch. By rotating the switch before pressing, the user will navigate in a side menu for selection of another function by pressing on a given position on the switch. Furthermore, a degree of automatic control is obtained in the shift of functions. These may be time-controlled and/or determined by situations such as incoming calls, or emergency messages to which the system responds by giving rotation and pressing of the switch the functions which match the situation that is to be dealt with.

With reference to Fig. 27 and Fig. 28, a brief explanation will now be given of an aspect
10 of the invention that is related to a vehicle with an on-board GPS system and a mobile telephone which via a PC with calendar and calculator functions is controlled by the switches and interactive system as shown previously.

Let us imagine the following scenario: A person is driving a car on the way to a
15 meeting. Traffic is dense and the person is held up in a queue. The GPS system knows where the car is. The person's calendar knows when the meeting starts. The system will thus see if the person will make it to the meeting or not by looking at the distance in relation to the time perspective. This can be used so that the system warns the driver if it sees that he will not make it on time. The system can also offer the driver the option
20 of calling his meeting hosts and advising them of his delay. The driver then needs only confirm with OK if it is desirable to give a message about delays. The system will find the right number and connect the driver via the telephone system to the recipient.

It is also possible to include in the system warning services from various traffic control
25 centres which transmit messages about delays or problems in the traffic which the system then takes into account in connection with reaching the destination in accordance with agreed times in the calendar, special traffic conditions, diversions in the road network, information regarding speed limits, fuel level and so forth.

- 30 Fig. 27a shows a screen image in which a normal driving situation is illustrated. The GPS navigation system is on and the clock and calendar are active. Figs. 27b - 27c indicate that the system has calculated that the driver will not reach the meeting on time on the basis of the current position of the car and its driver and the system therefore warns the driver. Field 2 shifts to functions for making a telephone call. In this case, it
35 is also possible that only one of the fields I - V shifts to OK. The driver is asked whether the system should call the meeting place. The driver optionally confirms his desire for a telephone connection by pressing IV.

- As described earlier in connection with Fig. 27b, field IV will be marked in order to better show the driver, who because of the driving may be in a concentrated or easily distractible situation, where he must press on the switch. To catch the driver's attention further, a "pointer" can appear on the display. In this case the pointer is shown as a pointing hand. Figs. 28a and 28b show how a pointer, e.g., in the form of a pointing hand, can help the user of the system to understand what must be pressed to activate a menu in the right-hand field.
- 10 Fig. 29a shows how the individual components that may be included in the system could be arranged, especially in connection with a use in vehicles. The reference numerals 117 - 120 indicate, e.g., window, sunroof, mirrors, seat, cruise control, windscreen wipers, telephone, ventilation fan and so forth which are controllable via respective interface 122, from a central processing unit (CPU) 123 that is controlled by 15 the switch device 124, and where the switch device is reproduced visually on a screen 125 in a field 126. If a common interface is not used for all the function units 117 - 120 or separate interfaces are used for each function unit 117 - 120, it will be understood that units corresponding to the interface unit 121 will be found between the unit 123 and each individual function unit.
- 20 Fig. 29b shows how adjustment of functional equipment can be effected, for example adjustment of the right-hand mirror 117', adjustment of the left-hand mirror 117'', adjustment of window 118', adjustment of headrest 119', adjustment of back rest 120', and adjustment of seat 120''. The central processing unit (CPU) 123 controls the 25 individual adjustments of the equipment, and a data bus 123' ensures that there is an exchange of information both ways between the microprocessor and the functional equipment. With a connected interface (see 121 and /or 122 in Fig. 29a), all control from the central processing unit could be effected via the data bus 123'. All components that are connected to the data bus will contain data related to identity and functionality.
- 30 The display 125 is connected directly to the central processing unit 123, but the multifunction switch 124 is expediently connected to the data bus 123' via a suitable interface 124'.
- Fig. 30 shows how a person by using his thumb 127 or both thumbs 127, 128, can 35 utilise the system where one or two switch device(s) 129, 130, 131, 132 are mounted on a steering wheel. A switch can be mounted in a similar manner on levers or handles 19

(see Fig. 4a) in proximity to and for use by the thumb. Fig. 30a and 30b indicate use of one switch device, whilst Figs. 30b and 30c indicate use of two switch devices.

- Fig. 31a shows a menu image 133 where the start-up of the system is associated with
- s the use of identity designation and password, and where the user can press on any one of the switch's pressure areas I', II', III' or IV' corresponding to the sub-fields marked with "Code" in the display field 2 in order to produce the menu image 134 as shown in Fig. 31b. First, the user enters his User ID by selecting the right letters and numbers, and the method is exactly the same as that shown and explained in connection with Fig. 10 12c and Figs. 13a - 13c. When the User ID has been entered in full with all the necessary signs and/or digits, the Password must be entered with the necessary number of signs and/or digits. When the user then presses OK on area III' of the switch, a menu as shown and described earlier will appear.
- 15 Fig. 32 shows the use of the system in connection with a multi-step movable sliding switch 135. Figs. 32a - 32c show how the cursor 136 will move from left to right over the options given at each step Y5 - Y1. This means that depression of the switch 135 at the respective pressure positions I', II' or III' will effect selection of a digit within the diamond-shaped cursor 136 at corresponding points. Depression of I' will effect the
- 20 generation of the number 1, depression of II' produces the number 2, and depression of III' generates the number 3. The same will be possible for the positions Y4 - Y2. In position Y1 it is possible to confirm the entered number or the code, delete everything (C), select another menu (M) or scroll up/down in a menu. Fig. 32d shows that the individual positions illustrated are related to a cursor that is movable in the Y direction
- 25 and which follows the switch control element 137, where the depression positions have been slightly changed to fit the indications that appear within the cursor 138. The numbers, signs, letters or the like which can be selected in this way will appear on the screen 139 in Fig. 32a or the screen 140 in Fig. 32d.
- 30 Fig. 33a shows how it is possible to browse through menu alternatives 141, here five such alternatives, by positioning the control element 142 of the sliding switch in one of the positions Y1 - Y5. The stepwise movement here corresponds to the possibilities of stepwise rotation which exist for the rotatable switch 5 or 6, 7.
- 35 Fig. 34 shows the use of the system according to the invention in association with a touch screen 142. Here, the multifunction switch will in reality be in the functionality that the touch screen provides. Instead of a separate rotatable switch, all switch presses

and even simulated rotation can be provided. The function is per se the same as regards the main menu, sub-menu and sub-sub-menus as that shown and described in connection with Figs. 25 - 28, and therefore a detailed explanation is unnecessary.

Rather than operating a separate multifunction switch, the operator can touch the screen

- 5 142 directly instead. In the situation shown in Fig. 26c, to simulate rotation of the switch, a marking of the field 143 can indicate where the operator/user should move his finger to adjust the telephone volume up or down, i.e., by following the field 143 in one direction or the other with the finger 144. Switch functions in the touch screen may be so designed that the movement along the field is perceived as stepwise.

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The present system will be especially suitable for interactive use of rotatable multifunction switches which have at least three pressure points with a screen arrangement, e.g., in a vehicle such as a car. The system that will now be described in connection with Figs. 35 - 55 is a further development and a variant of that shown earlier, but shows even more fully how a system of this kind can be used in a vehicle. Initially a system of this kind will have two main modes, menu-controlled functions and functions that are directly available outside the menus.

15

The control unit or multifunction switch as shown in connection with Fig. 17b - Fig. 17d, corresponding to that shown in Fig. 60 - Fig. 63, will expediently be capable of use in connection with the control of the system. However, it is also conceivable that the system could be used with multifunction switches as shown in Fig. 2a and Fig. 64 with a variant shown in Fig. 65 or the multifunction switch as shown in Figs. 2b, 2c and similarly in Fig. 66 and Fig. 67.

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Fig. 35 shows as a non-limiting example a display screen 145 which has a field 146 that displays an animation of the functions of the employed multifunction switch during use. A field 147 shows menus, sub-menus and functions in which it is possible to navigate and select by manipulating the multifunction switch. This field or the window on the screen image is the most dynamic area of that shown on the screen image 145, as it shows lists and the selection for all menus. The field 148 shows status and result of the selection made in connection with the fields 146 and 147 and is thus related to dynamic status, that is to say a display of the status of primary functions in the main menu. Status in this area will be the user's fast access to knowledge of how the system is, e.g., set up. The field 149 shows the menu mode, that is to say the name of active menus or sub-menus or sub-sub-menus at any given time. It is also possible that this field could show the title/name of a function.

The field 150 is designed to show active information concerning, e.g., navigation or optionally other functions that require figurative or animation-based display. This field may also optionally show other information when, e.g., a GPS system is inactive. When 5 a travel route for a vehicle is selected, navigation directions could be shown in this field or window.

Fig. 36 shows the screen image for the normal driving situation. In this figure, the system is in so-called fast-select mode, that is to say "Drive Mode". A distribution of 10 information on the display screen that is different from that indicated in Fig. 35 is thus obtained. Here, only the field 146 will give information about direct selection. The fields 147' - 149' will be designed to show functions which are needed by a driver whilst driving. Part of the field 3, indicated by the reference 147" could provide information about, e.g., optional rotation of the multifunction switch employed. The field 150' will 15 be active for information concerning navigation if such navigation has been activated.

Fig. 37a and Fig. 37b show a main menu consisting of the functions cruise control 151, navigation 152, speed limit alarm 153, telephone 154 and the MP3 functions 155. As shown in Fig. 37b, the menu may also include audio settings 156, trip computer 157, 20 time zone 158 and other options 159. When the user scrolls down through the list shown by rotating the multifunction switch, each function will successively be marked, highlighted or appear in another colour as the user rotates through the list. If the user continues to rotate "past" the "last" option in the list, a new page of functions will 25 appear. If the list is too long, an arrow 160 will point downwards, but the arrow will point upwards if the user has reached the bottom of the list and there are more functions further up in the list that are not visible, see Fig. 37a and Fig. 37b. If the user is in the middle of a list and there are more options both above and below that are not visible in the list, arrows will point in both directions. The field 146 shows the animation and function selection when the user presses on one of the three positions represented by I, 30 II and III. In the present case a press on I represents "Back", II, "Drive Mode" and direct selection in respective figures, and III is "OK" (confirms selection of marked menu/function). The field 148 shows the status for the different functions.

In the illustrated example the maximum number of elements in a list for one page is 35 five. Depression at position III will effect the selection of the highlighted menu 152 as shown in Fig. 37a. Rotation past the bottom of the main menu, that is to say past MP3, will result in the second page of the main menu being shown as indicated in Fig. 37b.

The small indicator consisting of arrows 160, 160' which point down and up respectively is found in all menus containing more than five items on the list. As shown in Fig. 37b, "Audio settings" 156 can, for example, be selected and marked.

- 5 Fig. 38 shows the screen image that is the result of the selection OK of cruise control 151 in Fig. 37a. The field 161 will effect the turning off or on respectively of the function when the multifunction switch is pressed at position III (OK). If the function "On" is selected, the line 162 will be marked, and here it will be possible to adjust the speed by rotating the multifunction switch. When desired speed has been reached, a
10 short press on the depression point III will activate the function and it will again be possible to move in the list by rotating the switch. Depression in position I will enable the user to return to the system's main menu. In the image indicated in Fig. 38, the cruise control, for example, has been set on "Off" as indicated for the field 161 ("Off").
15 In the illustrated example it will be possible, for instance, to adjust the speed by +/- 5km/h. A right-hand click on the multifunction switch activates the adjustment of the speed which will lock the multifunction switch to the second line shown in that the button remains "down". Rotation of the multifunction switch when the button is depressed will adjust the speed. When the button is down, the text on the depression position indicated on the right-hand side will be changed to "SET". However, a press
20 on both the left-hand side and in the middle result in the button rising and the user again being able to browse through the list. A left-hand depression of the multifunction switch can, as indicated by the reference I, take the user back to a main menu.

- Fig. 39a shows the screen image which is the result of the option 152 in the main menu
25 (Navigation). The field 163 indicates the on/off functions, the field 164 indicates a pre-entered list of travel routes, and the field 165 is related to the input of a new route or destination. In the illustrated example, the field 163 is in the "on" state and the route list 164 is also active, as indicated. Fig. 39b shows a list of pre-entered travel routes. The result of the selection from this list will be shown in the field 148, and directions will
30 appear in the field 150. If, for instance, the field 165 is selected, a screen image as shown in Fig. 39c will be obtained. With reference to Fig. 39b and, for example, the selection of the field 156, the route destination 167 will be shown in the field 148. Thus, this information could, for example, be related to the last route entered and will appear, e.g., with country, city, street and street number which can then be entered by
35 the user. The main idea is to lead the user through the system from the point at which the pre-set information is no longer correct. If, for instance, the named country and the named city are given correctly, the user, with reference to that shown in Fig. 39c, will

e.g., be able to start with the street name and will be able to move through the actual writing by using the write system of the present invention as shown in more detail in Fig. 39d - 39f. In Fig. 39c the reference numeral 168 indicates the field for the country, the reference numeral 169 city information, the reference numeral 170 street

5 information, and the reference numeral 171 the street number. Fig. 39d shows the choice of street in the field 149. Here, an alphabet will appear distributed in fields of three sub-fields at a time that are selected by a press on corresponding sub-fields I, II or III in the field 146. In the illustrated example, sub-field II is selected and the letters MNO spread out in the sub-fields I, II and III for input of letter, as shown in Fig. 39e.

10 Here, e.g., the letter M is required as the first letter in Müllerstrasse", as can be seen in more detail in Fig. 39f. This input procedure is repeated until all the letters in the street name have been entered. However, in connection with the input of letters, the system may include a predictive function which "guesses" the right name after the input of the first letter, which will then make it possible to avoid entering all the letters.

15 Alternatively, it will be possible to navigate through a fairly short list of names of likely options. If the system "guesses" that the name is right, it can be used quite simply by rotating the multifunction switch until the cursor reaches the bottom field 172 and then pressing on the multifunction switch to the right at OK. If the guess is wrong, the user must continue to enter letters. It should be noted that the letters in the rows where the

20 first letter was placed will now be changed to the new letters that are most likely to follow the letter first entered. This option is at most nine letters, but may be fewer depending on the street names that are stored in the system's database. An important aspect is that here the user no longer needs to rotate the multifunction switch to obtain the letters he requires, as in more than 95% of the cases the letters will probably be in

25 the list. If the user does not find the letter he wants in the list, it will quite simply be possible to rotate the multifunction switch in any direction and the letters will again be sorted alphabetically. It should also be noted that the text in the bottom of the dynamic status field 148 or the window which gives the user continuous information about how many possible options remain in the database. When the number is small enough, it

30 will be possible to scroll to the desired address from a list selected from the list option "List" in the fourth row. This list could have an identical design and function as the router list described above, so that the interface will be recognisable to the system user.

Fig. 39d - Fig. 39f thus show that as letters are entered, the list of stored street names

35 will steadily decrease. To go directly to the list, the sub-field 173 may be selected. The choice of the letter M as the first letter of the street name will require depression of the

multifunction switch II for Fig. 39f in order to produce the letters M, N and O in the sub-fields I, II III as shown in Fig. 39e.

- Fig. 40 shows the option 153 (speed limit warning) from the main menu shown for Fig. 5 37a. In the given example this function is set to "off" as indicated in the field 174. When in the "on" position, this function could be used to set a desired speed limit, and when this speed limit is exceeded, a vehicle driver could be warned by sound, light, animation on the screen or in some other way. The setting is effected in the same way as shown and described in connection with cruise control (see Fig. 38). Fig. 41a - Fig. 10 41g show the selection of the telephone function. The standard functions are shown here such as "Phonebook" 175, "Find name" 176, "Dial number" 177 and "Guess number" 178. The last-mentioned field 178 can be switched "off" or "on" depending upon whether the user wants a predictive function for guessing the number. The choice of "Phonebook" 175 could produce a screen image which is shown in Fig. 41d. The 15 telephone book may be a simple list of names that is sorted alphabetically. However, with a large telephone book list, it is not really possible to rotate the multifunction switch for each input. However, a multifunction switch as shown and described in connection with the present application provides the possibility of finding the name in the telephone book and dialling the number associated with a particular name.
- 20 When the desired name has been selected by rotation of the multifunction switch, e.g., the name as given in the field 179, depression of the multifunction switch at depression point III will cause the call to be connected, as indicated in Fig. 41c. Similarly, in connection with an incoming call it will also be possible to answer the call by pressing 25 on the multifunction switch for position III as shown in Fig. 41d. When the option "Find name" is required, as indicated in Fig. 41d, the input of text and numbers can be carried out. This can take place in the same way as otherwise shown and described in a slightly different way in some of the Applicant's previously filed patent applications.
- 30 After the selection of the first letter, the most likely letters to be used will be arranged alphabetically, and the first guess is made with the possible entries in the telephone book reduced to a far lower number. For all of these, it will only be necessary to have two letters, i.e., that the number of entries is so small that it is faster to navigate according to name than to enter the rest of the name. This can be seen *inter alia* from 35 that shown in Fig. 41f. When a telephone number is entered, as shown in connection with Fig. 41g, the screen image will appear, e.g., as shown. Dialling the digits that are a part of the telephone number is very similar to what happens with an ordinary mobile

telephone, except that guessing of the telephone number could take place in the same way as finding a name or entering a travel route. When, for example, the first digit 6 is selected by a press at depression point III, the remaining digits in the telephone number will be suggested. If this number seems to be correct, the telephone call can be
5 connected, as indicated earlier.

Fig. 42 - Fig. 45 show respective screen images for the functions MP3, audio settings, trip computer and time settings. The use and pattern for these will be the same as shown and described earlier. In connection with the embodiment shown in Fig. 42, the
10 upper field 180 will be a tilting function between "Play" and "Stop". The remainder of the list consists of titles of music files. When a music title is chosen, the music or song will automatically begin to be played. The volume control function is identical to that present for the rest of the system.

15 In connection with that shown in Fig. 43, it should be noted that for sound or audio settings, adjustment can be made by depression to the right at depression point III and then rotation of the multifunction switch to select the desired setting for the respective field, here, e.g., selected field 181 for bass function. When the desired adjustment has been made by keying the multifunction switch in some way or another, the
20 multifunction switch will be deactivated from being "locked" and the possibility of rotation through the list items will again be normal. It will be seen at the top of the field 148 that the MP3 music file that is being played is "Summer of '69".

25 The function associated with the trip computer is shown in Fig. 44 and is quite similar to the route list. The information associated with the highlighted list item is shown automatically in the field 148, that is to say information about the day's trip indicated in the field 182. The selection of the field 183 effects a resetting so that the information is cleared as long as the trip computer is active and resets original values when the user exits the menu.

30 Adjustment of time zone, as shown in Fig. 45, will be carried out in the same way as for the sound settings shown in connection with Fig. 43.

35 Figs. 46a and 46b are schematic illustrations of how a direct drive mode can be set up if the user is in a sub-menu which is shown in the earlier figures and presses II to enter "Drive Menu", whereby three options are obtained: I - "Cruise control", II - "Volume" and III - "Speed limit". By selecting one of these, the user will be able to obtain the

options shown in connection with Fig. 46b. The "Drive Menu" will enable the user to operate functions directly without entering sub-menus. It is possible to enter the "Drive Menu" from the main menu and the sub-menu by pressing down on the centre of the multifunction switch. The "Drive Menu" will also be inserted automatically after a fixed time delay after the last action on the switch was made. The three possible options in the "Drive Menu" will all work in the same way to enable the user to operate functions whilst giving a minimum of attention to the display. The volume control is a completely blind function, as the sound level gives an audible feedback. Of course, a voice can give feedback as regards cruise control and speed limit adjustments, so that these functions could also be considered to be blind.

After the entry of any one of the three options from the "Drive Menu", there will be an "On/Off" function all the way to the right, an additional function in the middle and a "Back" function to the left so as to make the depressions as alike as possible for the whole system.

Fig. 47a - Fig. 47c, with reference to Fig. 36, show the screen image in the drive mode ("Drive Menu"), where the reference numeral 184 points to a field that is to provide information regarding rotation of the switch to obtain a desired function, setting or volume. It is noted that the help text will help the user to operate the system more easily. As shown in Fig. 36, the user obtains a message in the field 147" saying he should rotate the multifunction switch in order to return to the main menu.

When cruise control, as indicated in Fig. 47a, is activated from the "Drive Menu", the speed can be adjusted directly on rotation of the switch. A depression to the right will effect a shift between "On" and "Off" and a depression in the middle will effect resumption of the function.

The speed limit that is obtained from the "Drive Menu" could be identical to cruise control.

Volume control has a "skip" function as a special function in the centre at the depression point II. In other respects the two drive menu functions are identical.

Figs. 48a and 48b show variants of what has been shown in the earlier part of the description and the drawing figures and in said Norwegian Application 2001 4796. In Fig. 48b hands are shown "thumb up" or "thumb down" as indicated by the respective

reference numerals 185, 186. An arrow 187 could indicate that there is a longer menu which can be shown on a further rolling of the multifunction switch. In connection with Fig. 48a, reference is made in particular to that shown and described in connection with Fig. 17a, Fig. 18a and Fig. 19a.

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The invention will now be explained further in connection with Fig. 49 - Fig. 52b. What these figures show is a further development of a rotatable multifunction switch with centre switch 6 and a stepwise rotatable control element 7 and depression points on the multifunction switch indicated by the references I', II', III', IV' and V' in Fig. 49, and corresponds to that in Fig. 2b. The centre switch 6 may either be a pure depression switch, a cursor or pointer device (with centre position deviation) or a combination of these two functions. Operative connection between the centre position deviation and pointer control is shown in a purely schematic manner in Fig. 50.

- 15 Whether the centre switch 6 has one function or the other or both functions will be determined by which mode a menu is in. Thus, the additional function for this multifunction switch will be that in a certain function mode it will have a free cursor control function so that it can move a cursor freely across a screen area in order to choose between functions and perform tasks. In a car it would be natural, for example, 20 to navigate a cursor or a pointer across a map sheet in connection with a GPS function. If, when using a multifunction switch of this type, the user wishes to utilise a system that contains the display of Web pages, a cursor on the screen would be difficult to navigate without such a function.
- 25 Fig. 51a shows a main menu where "Entertainment" indicated by the reference numeral 188 is selected. By rotating the switch (the control element 7), the user will be able to move across the menu as shown in Fig. 51b. A press on the centre switch II' in Fig. 49 will activate a "Back" or "Home" function. When "Interactive" is selected as shown in Fig. 51c, the system will be connected to a communications network and Web pages 30 can be shown on the screen. The depression at the depression point IV that is symbolised on the display will thus produce the Web page that is shown in Fig. 51d. A press on the same depression point represented by IV and the reference numeral 189 will make it possible to effect movement of a screen image in the X and Y direction by rotating the multifunction switch.
- 35 Figs. 52a and 52b show the selection from a known menu layout as shown in Fig. 8a. An additional function, namely the adjustment of the mirror, is shown here. When the

multifunction switch is depressed at position I as shown in Fig. 52a, a mirror function is produced as shown in Fig. 52b for the left-hand wing mirror of a vehicle. Depression of the multifunction switch at the respective depression points I - IV or III will enable the user to shift between the mirrors he wishes to adjust by using the system. It will be seen
5 that the centre switch 6 in this case changes function to a centre position deviation related switch to be able to control a pointer or cursor 190 by moving the switch 6 away from the centre position. It will be seen that whilst the pointer indicates where the mirror is to be adjusted, the real mirror will be adjusted accordingly. It is of course possible to adjust the mirror without showing this on the screen image as watching a
10 mirror in most cases will give an adequate feedback to the user of the system.

An additional explanation of the inventive system according to the present invention will now be given with reference to Fig. 53 and Fig. 54.

15 The multifunction switch that is referred to in connection with these drawing figures is related to that shown in Fig. 2b or 2c and Fig. 49. The system is based on that shown in connection with Fig. 1 - Fig. 16 and Fig. 25 - Fig. 27.

Fig. 53a shows a screen 191 with a main menu where a field 192 shows the press
20 functions that are available for the user function switch. The field 193 shows typical key data information, the field 194 shows data in connection with the selected function, and the field 195 shows menu and functions. To move in the menu, stepwise rotation of the multifunction switch will cause a cursor 196 to move successively over the various alternatives in the list shown. If there are more options than there is room for on the
25 screen, an arrow 197 will point to additional functions that will become available on further rotation of the multifunction switch. Fig. 53b shows how the arrow, indicated here by the reference numeral 198, points upwards when the user has come to the bottom of the list and the additional functions are available higher up on rotation of the switch. Position II on the multifunction switch shows on Fig. 53a and Fig. 53b a drive mode or "Drive Menu". This is a short cut from the main menu to a drive mode ("Drive
30 Menu") which allows direct access to important functions. The principle has been shown in connection with earlier figures in this application, but is also shown now in connection with Fig. 53w - Fig. 53xx.

35 With reference to Fig. 53a and Fig. 53b, it should be noted that at the top to the left there is "Climate information" (field 193) and in the line below "Audio information", e.g., associated with CD, radio or MP3, and status concerning cruise control ("Cruise").

- The text that is the field 194 is a help text which will vary according to the functions that are in operation. An animation of the multifunction switch will be recognised at the bottom to the left in the screen image. Text could be found on the buttons of the multifunction switch which could be made active at any time. The field 195 will tell the user about the functions which may be relevant for the multifunction switches at any given time. The small square to the left of each option, e.g., the square 199 may contain the icon related to the main menu. When the multifunction switch control element 7 is rotated between the different options, either a highlighting or another marking will clearly show the relevant menu line that is selectable. When, for example, the user rotates from the bottom line to the next page, all five options will be replaced by the options on the next page. If there is, for example, a total of eight options in a menu, the first page will have, e.g., five options and the next page three options. The two last positions on the second page will thus not be available even though the switch is rotated. The grid that is shown in the figures may be visible or invisible on the display screen. Although the display screen 191 is shown having straight corners, it is of course possible to adapt the shape of the display screen according to where it is to be installed. Thus, the display screen could easily appear as slightly rounded at the corners, but all activity on the screen will take place within a rectangular frame as shown.
- Figure 53c shows the screen image for an audio or sound system selected by OK (depression point III). Different audio functions are shown in connection with the field 200 and the cursor 196 will be placed on the desired function on rotation. In this case, MP3 is selected as shown in Fig. 53a and a screen image as shown in Fig. 53d and Fig. 53e then appears. These will be more or less the same for a CD player. When pressure point I shown in Fig. 53d is pressed, rotation of the multifunction switch will effect adjustment of sound.

- If one of the sound sources is switched "on", this is shown by, e.g., "On" as indicated in the field 201 in Fig. 53c. This applies even if the sound source has been activated from the Drive Menu. If the user enters, e.g., CD player, i.e., the field 202 whilst the radio is "on" and switches the CD player on, this will be shown when the user returns to the audio system in that "On" is moved from radio to CD player. The selection of sound source can be effected by depression to the right when the sound source required is highlighted. The information field 203 will give information about the sound source that is active and what is playing at a particular moment in the form of audio information.

The MP3 player can be further explained in connection with Fig. 53d, where it should be noted that "Play/Stop" is given in the list field 204 and on the animation of the multifunction switch. In principle, these should always match one another. When the multifunction switch is rotated, the marking 205 will move downwards and in this case the text on the animation will change to only "Play". If the user presses on, for example, "Track 4", the next image will show additional music or song tracks that exist, so that instead of "Track 1" to "Track 4", the user will find "Track 4" to "Track 7". Fig. 53e shows in more detail the adjustment of sound, indicated by the arrows 206. When the user depresses the switch for the pressure point I, the "button" will indicate in the animations that it is "down" and the arrow 206 which marks the rotation will appear. A depression in the centre at depression point II or on depression point I will return the user to the list of songs.

The screen image shown in Fig. 53f shows an example associated with radio function. This will function in exactly the same way as the MP3 player except that in this case there are radio channels instead of songs or music. Information of what is coming from the radio is in the said audio information from the field 203.

Fig. 53g has been included to show the adjustment of sound functions such as "Treble", "Bass", "Balance" and "Fader" (i.e., for example, adjusting sound level between the front and back speakers, where up-down adjustment can be done by rotation or depression of the multifunction switch).

Fig. 53h and Fig. 53i show the use of the system according to the invention in connection with the control of air and temperature. Fig. 53i shows the adjustment of fan speed on rotation of the multifunction switch or on depression, e.g., in pressure position III.

Fig. 53j - Fig. 53n show selected "Phone" from the main menu as shown in Fig. 53a. Fig. 53j and Fig. 53k show the options in a telephone menu. Fig. 53l shows the screen image where "Phonebook" has been chosen. Fig. 53m shows the screen image in a call phase and Fig. 53n shows the screen image for input or dialling of the number. Here, the matrix/"keypad" corresponds to that shown in screen part 195, with the multifunction switch's pressure points I, IV and III for the numbers marked horizontally by the cursor 207. The numbers for the respective depressions will be shown in the animation 192. Thus, there will not be any doubt as to where the user should place his

finger on the multifunction switch in order to enter the correct digits in a telephone number.

It will be seen in Fig. 53l that the "Phonebook" has possibilities for adding names in the
5 first line 208 in the field 195, whilst the other names in the telephone list are sorted alphabetically. The name that is highlighted will also appear in the information window or the field 194 complete with number. When the option desired has been highlighted, it will be possible to ring directly by pressing on the telephone icon as shown in Fig. 53l (the pressure point III).

10 Fig. 53m shows the image that is generated when a call is in progress. It is not necessary to press on VOL, the depression point I, to adjust the sound, as this is not an option in the list. If the user exits this menu whilst a call is in progress and then selects "Phone function" from the main menu, it will be the image as shown in Fig. 53l that will
15 be shown directly.

It is also possible in connection with the system shown in Fig. 53 to adapt this, e.g., to an in-box system for, e.g. SMS messages that are received, in that the messages could be listed in the field 195 and the content of the message could be shown automatically
20 in the field 194 when the message or the sender is marked in the field 195. If the message received is longer than the field 194 has room for, it will be possible to read through the message by using the rotary part of the multifunction switch to rotate
through the text.

25 Fig. 53o - Fig. 53r will now be described in more detail, these figures showing the screen image for the input of text in a telephone mode.

Fig. 53o - Fig. 53p show examples where the user is in a "Phonebook" and is looking for a name by entering letters. Here, as shown in Fig. 53p the letter N has been entered
30 and the system will thus guess names in addition to letters that are likely and are placed in the field 209. The letters involved here are the letters A - E - I - O - U - Y, which are the most likely alternative, following letters for names in the list. In this connection, reference may also be made to the disclosure of Norwegian Patent Application 2001
5349. The indication 210 refers to how many names there are in the telephone list
35 concerned. By rotating the multifunction switch, it is possible to mark three letters at a time via the "keypad" which is in the field 209 and then move to the field 211 and down to the field 212. The alternatives that "are rolled over" will be directly available when

the multifunction switch is pressed in the positions as indicated in the animation 192. Thus, it will be understood that after the first letter has been entered, only the letters that are possible in relation to the rest of the telephone list are presented. This number can of course vary in each individual case.

5

In connection with Fig. 53q it will be noted that writing an SMS message may be slightly different from "Find Name", as it must also be taken into account that the user will try to write words that do not exist in the word list present. The starting point is still the QWERTY format before the first letter has been entered. Of course, it is 10 possible to allow the format to be based on the ordinary alphabetic order, as known from *inter alia* various types of mobile telephone. It is also possible to disconnect the predictive system.

However, it will be understood that input in SMS mode as shown in Figs. 53q and 53r 15 will have essentially the same mode of operation as described previously, although a message is now being written. Fig. 53s - Fig. 54v show the use and input in connection with the system for navigation GPS mode.

Fig. 53w shows the system with the screen image in connection with cruise control. In 20 this menu image, the user will automatically be able to adjust his speed in steps of 5 km/h by rotation of the multifunction switch. "On"/"Off" is the same as in all the other menus.

Fig. 53x shows a map display menu in the drive mode. Depression in the field III will 25 switch the map image "off" and "on", and this is shown to the right on the screen in a field 213. When the map is activated ("switched on"), the image can be shown in the right-hand part of the screen where the previously described list is also shown. It will be possible to simply place the text over the map in the menus when the map is active, but so that the marked field (in this case "Audio System") optionally covers a part of the 30 map as shown in Fig. 53x or is transparent so that the map can be seen in part. A press on the multifunction switch in the field IV or I will allow navigation either vertically or horizontally in the map. The press on the depression point IV will activate a zoom function. When one of these choices has been made, the "button" in question will be shown as being "down" in the animation.

35

An MP3 or audio function is shown in Fig. 53z where it is possible to adjust the volume and where it is also possible to skip between songs/channels depending on whether it is

an MP3, CD or radio that is active. There are also ways of skipping via "Source" "through" and from one to the next of the list of different sound sources.

- 5 Fig. 53xx shows a solution where air conditioning can be switched on and off in addition to temperature adjustment. It is possible that additional functions may be added.

- 10 Fig. 54a shows a main menu where GPS has been activated. Information and directions are shown in the field 194. From the main menu, e.g., as shown in Fig. 54a "Car computer" is selected and a screen image as shown in Fig. 54b appears. Here, e.g., "Today's trip" is selected. Fig. 54c indicates fuel information.

- 15 Fig. 54d and Fig. 54e shows the screen image for adjusting the mirror. After one of the mirrors has been selected, the screen image as shown in Fig. 54c will appear, and there is the option of selectively pressing on one of the four corners of the multifunction switch, that is to say the depression points I, IV, III and V for adjustment. When, for instance, the arrow which is pointing up is pressed on, i.e., at the pressure point IV, this button will apparently remain "down" (shown like this in the animation). When the ring-shaped control element of the switch is rotated in one direction or the other, the 20 mirror will be adjusted about an X axis. When depression point IV is activated, depression point V will at the same time indicate that it is "down" in order to indicate direction of movement which is possible during adjustment. The same will apply for the depression points I and III, i.e., turning the mirrors about a Y axis. The user returns to the menu for the mirror by using the "Back" function. Similar possibilities will be 25 present for windows as indicated in connection with Fig. 54f and Fig. 54g. In Fig. 54h a main menu is shown in connection with the "Drive Menu". A central press at the depression point II takes the user back to the main menu. Thus, the user will be able to reach functions quickly without having to go back via the menu system.

- 30 Fig. 55a and Fig. 55b show an example of part of a dashboard in a car in which the system described in connection with preceding Fig. 53 and Fig. 54 could be directly applied. The actual interactive display of the switch's functions is surrounded by speedometer 214, revolution counter 215 and fuel gauge 216. Fig. 67a shows a main menu 217. A press on the centre button at the depression point II (D) will produce the 35 "Drive Menu" as shown in Fig. 55b. As shown in Fig. 55b, the user will not have any possibility of making adjustments in connection with the main menu, which is related to a safety aspect during driving. If the user wishes to return to the main menu, this will

- be possible by pressing on the centre button at the depression point M, reference II. Whilst driving, however, depression at depression point I will allow setting of cruise control. It will also be possible to fetch up audio functions by depression on depression point IV as shown on the animation of the multifunction switch. Activation of a switch function at depression point III on the animation and correspondingly on the multifunction switch would activate control of the air conditioning in the car.
- Depression at the depression point V would activate a GPS function with corresponding depression on the multifunction switch. The GPS function will be useful in connection with navigation in order to find one's way to, e.g., a particular address. However, technology associated with such navigation systems is well known. Although the invention has been illustrated and described in connection with multifunction switches of different types, it is also conceivable that other multifunction switches and combinations thereof could be used.
- Fig. 56 shows a roller switch and Fig. 57 another roller switch which is slightly more elongate. These roller switches that are shown in Fig. 56 and Fig. 57 are indicated by respective reference numerals 218 and 219. These switches can also optionally be depressible in the centre thereof. In addition, there is shown in Fig. 58 a stepwise rotatable, disc-shaped switch that is indicated by the reference numeral 220. The switch solutions shown in Fig. 56 - Fig. 58 can each be used together with, for example, a known four-way tilting switch with a fifth, central depression point, as indicated by the reference numeral 221, where the respective depression points are indicated, as in the preceding text, by the reference numerals I', II', III', IV' and V'. In Fig. 60 there is a roller switch 222 which has three depression points I', II', III'. The depression points I' and III' can be replaced by depression switches 223 and 224 which, as mentioned, represent the respective depression points I' and III'. By using two switches in this way, it will be necessary either to operate one switch at a time with one finger, or use one finger on each hand simultaneously.
- Fig. 62 shows a roller switch 226 which is sideways tiltable in order to activate respective switch functions, symbolised by the activation points I' and III'. The central depression point is indicated by the reference numeral II'. In Fig. 63 the depression points I' and III', activatable by sideways tilting, have been replaced by depression switches 227, 228, and the stepwise rotatable roller switch is indicated by the reference numeral 229 and has a central depression point also indicated in this figure by reference under II'.

The solution shown in Fig. 64 will now be described in some more detail in relation to that shown and described in connection with Fig. 2a. The rotatable control element of the multifunction switch is indicated here by the reference numeral 5, and there are depression points I', II', III', IV' and V'. It will be seen that the depression points just mentioned are within the circumference of the disc-shaped control element 5. Fig. 65 shows the disc-shaped control element 5', but the depression points I', III' - V' have been moved outside the circumference of the stepwise movable disc 5' and are operated in the form of the respective depression switches 230, 231, 232 and 233. The central depression point II' is still present.

10

Fig. 66 and Fig. 67 correspond directly to Fig. 2b and Fig. 2c and will not be described in more detail, as the same reference numerals have been used. However, the figures have been included here to facilitate the understanding of the embodiments that are shown and described in connection with Fig. 35 - Fig. 55. Although it is not shown explicitly in connection with Fig. 35 - Fig. 55, it will be understood that the system can also be used with a touch screen.

P a t e n t c l a i m s

1.

A system for use with a stepwise rotatable, multifunctional switch device intended for use in electronic equipment, as e.g., hand-held electronic apparatus and/or devices which are associated with use in means of transport such as vehicles, boats and aircraft, said equipment having or being connected to a display for function control, and where rotatability is designed to operate selection in a menu, the display having display fields which indicate the activation points of the switch device for selection in a main menu and later selection in at least one sub-sub-menu,

characterised in

- the switch device consists of one single, stepwise rotatable multifunctional switch which has four or five defined depression points for activation of respective switch functions, and where rotation is designed to operate both browsing and selection in a menu; and

- that the display has a first display field which reproduces the real configuration of the switch device and the five depression points for selection in a main menu and later selection in at least one sub-sub-menu, and a second display field which on stepwise rotation of the switch is designed to cause movement of a cursor over the sub-menu and selection therein by means of depression of the switch in one of the five depression points, said sub-sub-menu selection being subordinate to the sub-menu.

2.

A system for use with a switch device comprising a stepwise rotatable, multifunctional switch in cooperation with two non-rotatable pressure switches, where the system is intended for use in electronic equipment, as e.g., hand-held electronic apparatus and/or devices which are associated with use in means of transport such as vehicles, boats and aircraft, said equipment having or being connected to a display for function control, and where rotatability is designed to operate browsing and selection in a menu, the display having display fields which indicate the activation points of the switch device for selection in a main menu and later selection in at least one sub-sub-menu,

characterised in

- that the rotatable, multifunctional switch is a roller switch having three depression points or having one depression point and two sideways tilt points for activation of a respective switch function; and

- that the display has a first display field which reproduces the real configuration of the switch device, the activation points of the roller switch and the depression points

of the pressure switches for selection in a main menu and selection in at least one sub-sub-menu, and at least a second display field which on stepwise rotation of the roller switch is designed to cause movement of a cursor over the sub-sub-menu and selection therein with the aid of the switch device, said sub-sub-menu selection being subordinate to the sub-menu.

3.

A system for use with a switch device comprising a stepwise rotatable, multifunctional switch intended for use in electronic equipment, as e.g., hand-held electronic apparatus or devices which are associated with use in means of transport such as vehicles, boats and aircraft, said equipment having or being connected to a display for function control, and where rotatability of the switch is designed to operate selection in a menu, the display having display fields which indicate the activation points of the switch device for selection in a main menu and later selection in at least one sub-sub-menu,

characterised in

- that the rotatable switch is one single stepwise rotatable roller switch having activation points in the form of three depression points, or in the form of one depression point and two sideways tilt points for activation of a respective switch function, and where the stepwise rotation of the roller switch is designed to operate both browsing and selection in a menu; and
- that the display has a first display field which reproduces the real configuration of the switch and activation points for selection in a main menu, then in a sub-sub-menu and later in at least one sub-sub-menu selection, and at least a second display field which on stepwise rotation of the switch is designed to cause movement of a cursor over and selection in a) the main menu, b) then the sub-menu and c) then in said at least one sub-sub-menu.

4.

A system for use with a switch device comprising a stepwise movable, multifunctional switch, where the system is intended for use in electronic equipment, as e.g., hand-held electronic apparatus and/or devices which are associated with use in means of transport such as vehicles, boats and aircraft, said equipment having or being connected to a display for function control, wherein the switch is a sliding switch having a control element with at least three activation points involving depression or tilting for activation of a respective switch function, and where the stepwise sliding movement is designed to operate browsing and selection in menu,

characterised in

- that the display has a first display field that reproduces the real configuration of the sliding switch with the stepwise movable control element, and the activation points of the control element for selection in a main menu and selection in at least one sub-sub-menu, and that the display has at least a second display field which on the stepwise movement of the switch control element is designed to cause movement of a cursor over the sub-menu and selection therein with the aid of the switch device, said sub-sub-menu being subordinate to the sub-menu.
- 5.

- 10 A system for use with a multifunctional switch device to provide a multifunctional switch function, where the system is intended for use in electronic equipment, as e.g., hand-held electronic apparatus and/or devices which are associated with use in means of transport such as vehicles, boats and aircraft, said equipment having or being connected to a display for function control, and the switch device having at least three depression points for activation of a respective switch function,
- 15 characterised in
- that the switch device is a touch screen which at the same time forms said display;
 - that the touch screen has a first display field which reproduces an animation of
- 20 the configuration of one single multifunctional switch and activation points for selection in a main menu and selection in at least one sub-sub-menu, and at least a second display field which on a circular arc movement of an operator's finger in an indicated field on the touch screen in connection with the first display field in order to simulate a stepwise rotation of the switch, is designed to cause movement of a cursor over a sub-menu and
- 25 selection therein by means of depression on the switch shown on the screen, said sub-sub-menu selection being subordinate to the sub-menu.

6.

- 30 A system for interactive use with a multifunctional switch device intended for use in electronic equipment, as e.g., hand-held electronic apparatus and/or devices which are associated with use in means of transport such as vehicles, boats and aircraft, said equipment having or being connected to a display for function control, and the switch device being designed to move a cursor over and activate different menu alternatives associated with functions, sub-functions and/or sub-sub-functions,
- 35 characterised in that the multifunctional switch device is selected from the group consisting of:

- a) a stepwise rotatable control element in the form of a disc which is designed on rotation to move the cursor stepwise in the menu image, and which is depressible at one depression position to actuate a switch function associated with the menu image among the options indicated by the cursor, and where the control element together with additional switches is designed to control the system;
- b) a centrally located first control element that is non-rotatable but radially displaceable relative to its centre position in order to execute a centre position deviation-based mouse function for control of the cursor, and on depression to execute a switch function, and a second, stepwise rotatable control element that encircles the first control element for movement of the cursor in a certain direction in a menu image, the second control element being depressible at four depression points to actuate a respective switch function associated with the menu image;
- c) a centrally located first control element that is non-rotatable but radially displaceable relative to its centre position in order to execute a centre position deviation-based mouse function for control of the cursor, and on depression to execute a switch function, and a second, stepwise rotatable control element that encircles the first control element for movement of the cursor in a certain direction in a menu image, and additional switches which on depression are designed to actuate a respective switch function associated with the menu image;
- d) a stepwise rotatable control element in the form of a roller that is designed on rotation to move the cursor stepwise in the menu image, where central depression of the roller or depression of switch keys located one on either side of the roller is designed to actuate a respective switch function associated with a function among the options marked by the cursor;
- e) a stepwise rotatable control element in the form of a roller which is designed on rotation to move the cursor stepwise in the menu image, and which on tilting to one side or the other or on central depression of the roller is designed to actuate a respective switch function associated with a function among the options marked by the cursor;
- f) a four-way tiltable and centrally depressible control element for movement of the cursor stepwise over options in the menu, tilting about a first axis causing stepwise browsing in the menu image, whilst tilting about a second axis or central depression of the control element is designed to cause activation of a switch function associated with a function among the options indicated by

- the cursor;
- g) g) a first, stepwise rotatable control element in the form of a disc or a roller that is designed on rotation to move the cursor stepwise in the menu image, and a second control element interactive with the first control element and in the form of a disc that is depressible at four or five depression points in order to actuate a respective switch function associated with the menu image among the options indicated by the cursor;
- h) h) a touch screen which reproduces an animation of a multifunction switch having a mode of operation like that of one of the switches of type a) - f),
- and that the system is designed to produce on the screen of the display a screen image composed of:
- a first display field that is designed to indicate the functions of the switch device, possible operations and/or operation instructions related to the device and associated with the menu, sub-menu or sub-sub-menu selected at any given time, and activation points for selection in the main menu and selection in at least one sub-menu or sub-sub-menu, the switch device optionally being displayable on the screen image in the form of an animation of the device;
 - a second display field that is designed to show menus, sub-menus, sub-sub-menus or instructions related to selection or execution of functions on manipulation of the switch device, or on the stepwise rotation of the rotatable control element cause movement of a cursor over the sub-menu and selection therein by means of the switch device.

7.

- 25 A system as disclosed in claim 1, 2, 3, 4, 5 or 6, characterised in
- that options for selection in a main menu, sub-menu and/or sub-sub-menu are designed to be shown in the first display field at each of the depression points.

30 8.

- A system as disclosed in claim 1, 2, 3, 4, 5 or 6, characterised in
- that the sub-sub-menu options of the sub-menu are designed to be shown at the same time in a third display field with marking of the selected first sub-sub-menu.

35

9.

- A system as disclosed in claim 8, characterised in

- - that at a selected part in the first sub-sub-menu the system is designed to show in the first display field options in a second sub-sub-menu that is subordinate to the selected part of the first sub-sub-menu.
- 5 10. A system as disclosed in claim 8, characterised in
 - - that at a selected part of the second sub-sub-menu the system is designed to show in the first display field options in a third sub-sub-menu that is subordinate to the selected part of the second sub-sub-menu.
- 10 11. A system as disclosed in one or more of the preceding claims, characterised in
 - - that the system is designed to show a change in the marking in a selected sub-sub-menu in response to activation of the switch device on one of its activation points and thus adjustment of the function related to the sub-sub-menu.
- 15 12. A system as disclosed in claim 1, 2, 3, 4, 5 or 6, characterised in
 - 20 - - that successive scans of options in the sub-menu are designed to successively change the display in the first display field of corresponding sub-sub-menus or sub-sub-functions.
13. 25 A system as disclosed in claim 1, 2, 3, 4, 5 or 6, characterised in
 - - that a selected menu in the sub-menu causes display of corresponding sub-sub-menus or sub-sub-functions in the first display field.
14. 30 A system as disclosed in claim 1, 2, 3, 4, 5 or 6, characterised in
 - - that the sub-menu contains letters, signs and/or numbers; and
 - - that stepwise movement of the cursor causes indication in the first display field of the sub-sub-menu options that the cursor indicates in the second display field.
- 35 15. A system as disclosed in claim 14, characterised in

- - - that a selected part or successively selected parts of an indicated sub-sub-menu are designed to be shown in a third display field.

16.

5 A system as disclosed in one or more of the preceding claims,
characterised in

- - - that the sub-menu and the sub-sub-menus form a part of a telephone system, an SMS message system, an e-mail system and/or a map-based direction or orientation system.

10

17.

A system as disclosed in one or more of the preceding claims,
characterised in

- - - that the display has a third display field for the display of selected
15 functions associated with main menu, sub-menu or sub-sub-menu.

18.

A system as disclosed in claim 17, characterised in

- - - that said third display field is designed to show in real time the
20 adjustment of a function-related operation which pertains to a selected part of a menu.

19.

A system as disclosed in claim 1, 2, 3, 4, 5 or 6, characterised in

25 - - - that the switch device is designed to control functions in equipment selected from the group: telephone, mobile telephone, electronic notebook (PDA), mini computer (PC), multicomunicator, photographic and film equipment, radio, access and control equipment, fault localisation and analysis equipment, music system, remote control equipment for apparatus and
30 apparatus function.

20.

A system as disclosed in claim 1, 2, 3, 4, 5 or 6, characterised in

- - - that the switch device is designed to control in a means of transport
35 functions selected from: cruise control; movement of windows; control of visibility, including control of windscreen wipers; control of mirrors; map-based navigation; seat and comfort settings; adjustment of inside air temperature and

air supply; manipulation of mobile telephone, electronic notebook (PDA), mini computer (PC), multicomunicator, radio, access and control equipment, fault localisation and analysis equipment, music system, remote control equipment for apparatus functions.

5

21.

A system as disclosed in claim 1, 2, 3, 4, 5, 6 or 20, characterised in

- - that the rotatable switch of the switch device on rotation or simulated rotation via the touch screen in one direction or the other is designed, via an interface, to cause rotational movement to be converted to physically visible or simulated movement of or part of equipment, e.g., opening and closing a window or sunroof; adjusting mirrors or film projector on a horizontal and vertical plane; seat adjustment; adjustment of air flow in a ventilation system; volume adjustment of audio system or of conversations via audio and mobile telephony.

10
15
22.

A system as disclosed in claim, 1, 2, 3, 4, 5 or 6, characterised in

- - that an information field is available on the display for the presentation of information selected from the group:
 - present position;
 - target position;
 - appointment data;
 - non-conformance data, e.g., planned and estimated time of arrival at target position, local speed limits, tunnel entrances, local road diversions, advice of mobile telephone calls with indication of the caller's identity, distance to nearest fuel station and distance that can be driven with remaining fuel;
 - suggested activity related to non-conformance data, e.g., calling meeting place at target position, indication of calculated time of arrival at desired position with suitable increase or decrease in speed, closing of windows and closing of supply of outside air, collecting or rejecting mobile telephone calls, directions for shortest route in terms of distance and/or time for normal road connection or for deviation.

30
35

23.

A system as disclosed in one or more of the preceding claims, characterised in

- - that for marking the most obvious selection of function in the first display field, the system is designed to show a pointer that indicates the option.
- 24.
- 5 A system as disclosed in claim 23, characterised in
- - that the pointer is designed to extend from the relevant main function, sub-function or sub-sub-function shown to the relevant position or recommended option position on the switch device represented in the first display field.
- 10
- 25.
- A system as disclosed in one or more of the preceding claims, characterised in
- - that selected main function, sub-function or sub-sub-function is marked by framing, shading, colour change or colour saturation.
- 15
- 26.
- A system as disclosed in claim 1, 2, 3 or 4, characterised in
- - that the switch device is mounted on the steering wheel, control lever(s) and/or handles of a means of transport.
- 20
- 27.
- A system as disclosed in claim 1, 2, 3 or 4, characterised in
- - that two, preferably diametrically positioned switch devices are mounted on the steering wheel of a means of transport.
- 25
- 28.
- A system as disclosed in any one of the preceding claims, characterised in
- - that the operations of the multifunctional switch device and the resultant adjustment of the respective functions associated with equipment on use of the switch are communicated via a common data bus that is connected to a central processing unit (CPU).
- 30
- 29.
- 35 A system as disclosed in claim 1, 2, 3, 4, 5 or 6, characterised by

- - - a third field that is designed to indicate the mode of the system related to the menu, sub-menu or sub-sub-menu concerned, or at least one parameter associated with the function of the means of transport.
- 5 30. A system as disclosed in claim 29, characterised in that the screen image additionally has:
- - a fourth field that is designed to show status and result of selections made by using the multifunction switch or at least one parameter associated with the function of the means of transport.
- 10
31. A system as disclosed in claim 29 or 30, characterised in that the screen image additionally has:
- 15 - - a fifth field designed to show figuratively and/or an animation of function information and/or results.
32. A system as disclosed in claim 29, 30 or 31, characterised in
- 20 - - that at least two of said fields are active simultaneously.
33. A system as disclosed in one or more of claims 29-32 when subordinate to claim 6, characterised in
- 25 - - that the system is designed in a given menu image to selectively determine whether the first control element in the multifunction switch is of the type a), has mouse function or depression-based switch function.
- 34.
- 30 A system as disclosed in one or more of claims 1, 2, 3, 4, 5, 6, 29-33, characterised in
- - that the first field is designed to show the possible operations that the multifunction switch is able to carry out in connection with a given menu, sub-menu or sub-sub-menu, the first field being divided into three sub-fields.
- 35
35. A system as disclosed in claim 34, characterised in

- - that on the selection of one sub-field the system is designed to split the sub-field up into three new sub-fields for selection of one of these new sub-fields.

5 36.

A system as disclosed in any one of the preceding claims, characterised in

- - that the second field is designed to contain functions with associated sub-functions, optionally also sub-sub-functions, selected from the group consisting of:

- - automatic cruise control,
- - navigation,
- - speed limit,
- - telephone,
- 15 - - music system,
- - sound settings,
- - distance meter,
- - time zone,
- - user-adapted options.

20

37.

A system as disclosed in any one of the preceding claims, and when used in connection with a means of transport, characterised in

- - that the third field in the drive mode of the means of transport is designed 25 to show the total historical distance driven by the means of transport and/or the distance driven from an indicated starting point.

38.

A system as disclosed in any one of claims 29-37, and when used in connection with a 30 means of transport, characterised in

- - that the fourth field in the drive mode of the means of transport is designed to show at least one parameter selected from the group:

- - fuel level of the means of transport,
- - engine temperature of the means of transport,
- 35 - - temperature outside the means of transport,
- - temperature inside the mans of transport.

39.

A system as disclosed in any one of claims 31-38, and when used in connection with a means of transport, characterised in

- that the fifth field in the drive mode of the means of transport is designed to show GPS-related directions or a map function associated with the navigation data entered.

40.

A system as disclosed in claim 39, characterised in

- 10 - - - that the map function is connected to a zoom option.

41.

A system as disclosed in any one of claims 31-39,

characterised in

- 15 - - - that the fifth field is designed to show means of transport parameters associated with selection from the group:
 - - current speed,
 - - engine speed,
 - - engine temperature,
 - 20 - - fuel level.

42.

A system as disclosed in any one of the preceding claims, where the system is used in connection with a means of transport, characterised in

- 25 - - - that the system in the drive mode of the means of transport is designed to show in the first field only possible operations associated with fast select functions.

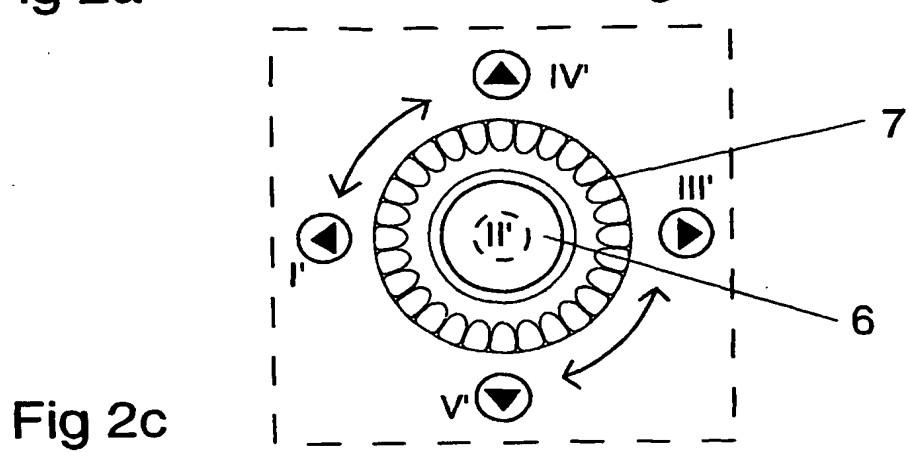
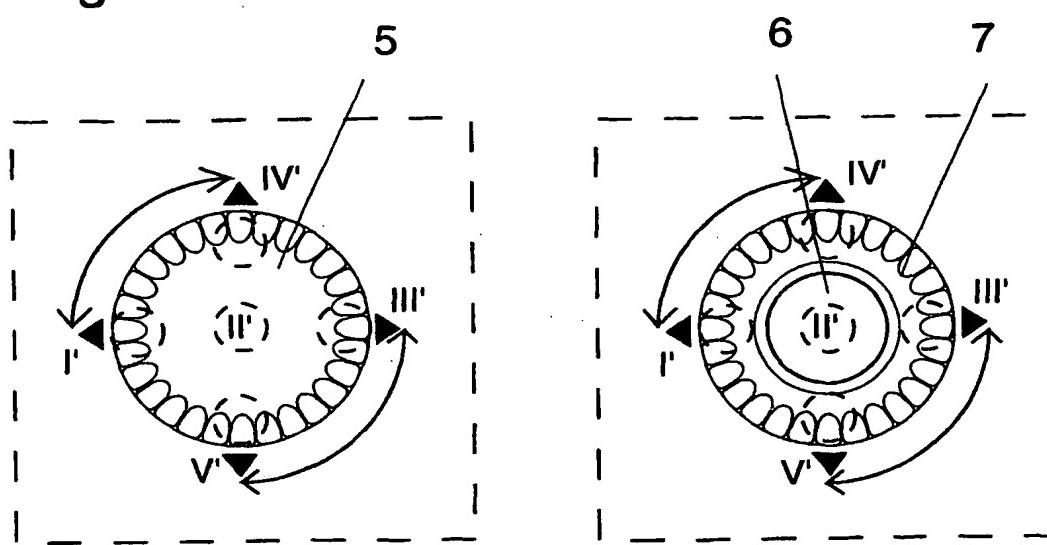
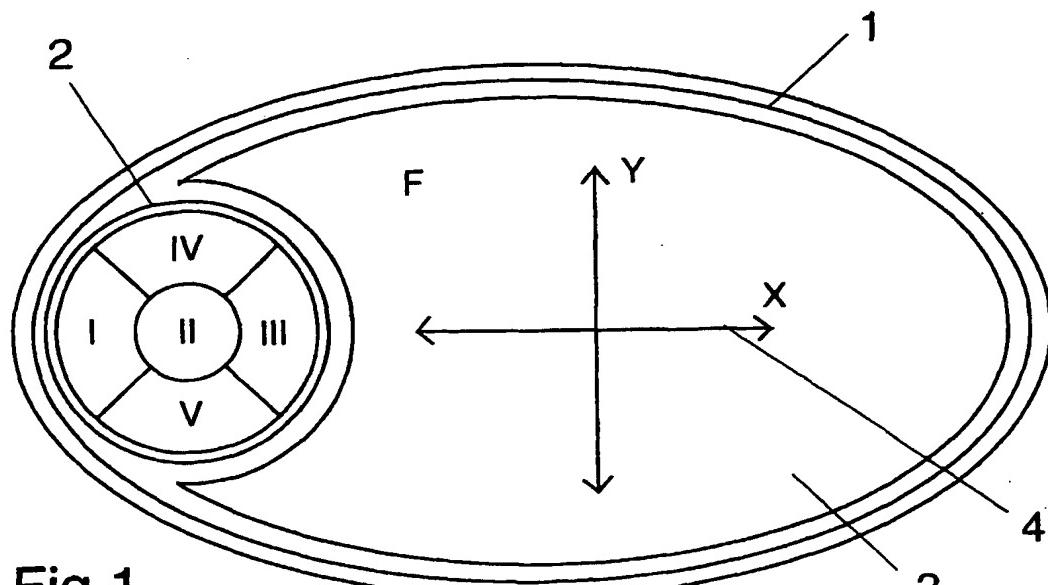
43.

- 30 Use of a system as disclosed in any one of the preceding claims, where a common communication bus is used between a central processing unit (CPU), a multifunctional switch and the equipment to be controlled for two-way communication in order to simplify the communications links.

35 44.

The use as disclosed in claim 43, wherein the communication bus is used together with interface equipment in the switch and said equipment.

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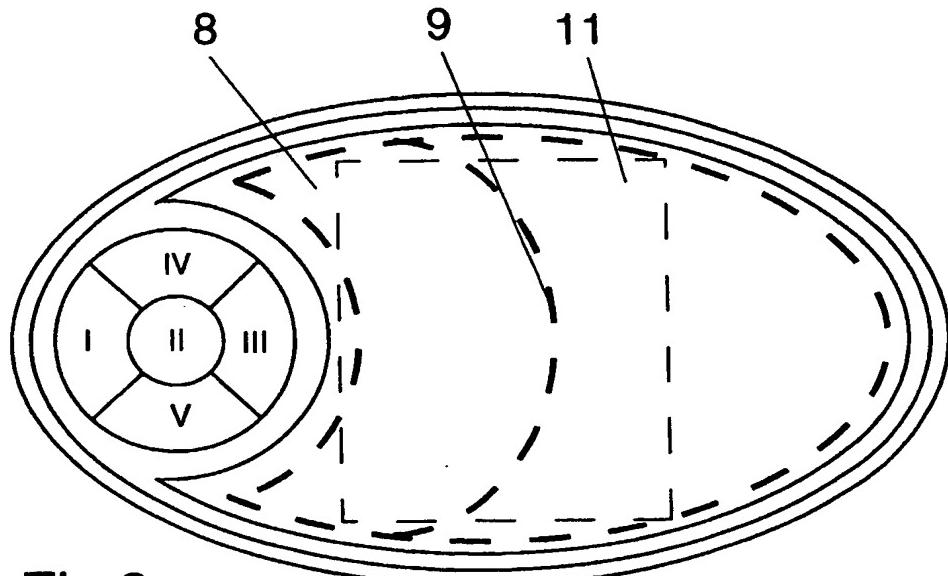


Fig 3



Fig 4a



Fig 4b



Fig 4c



Fig 4d

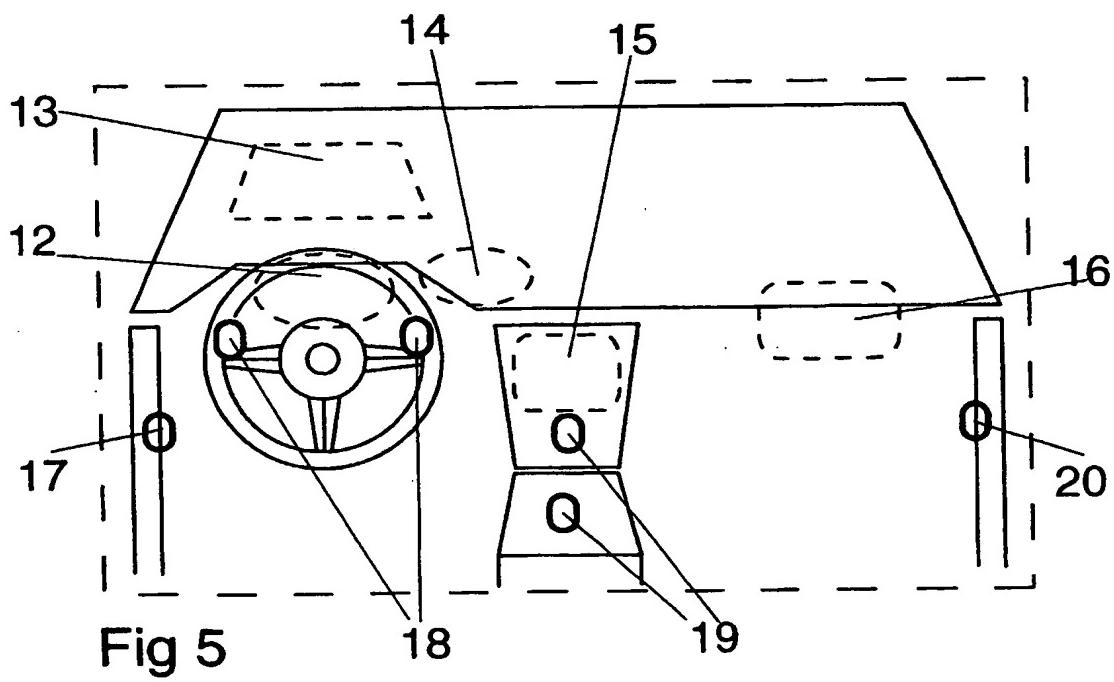
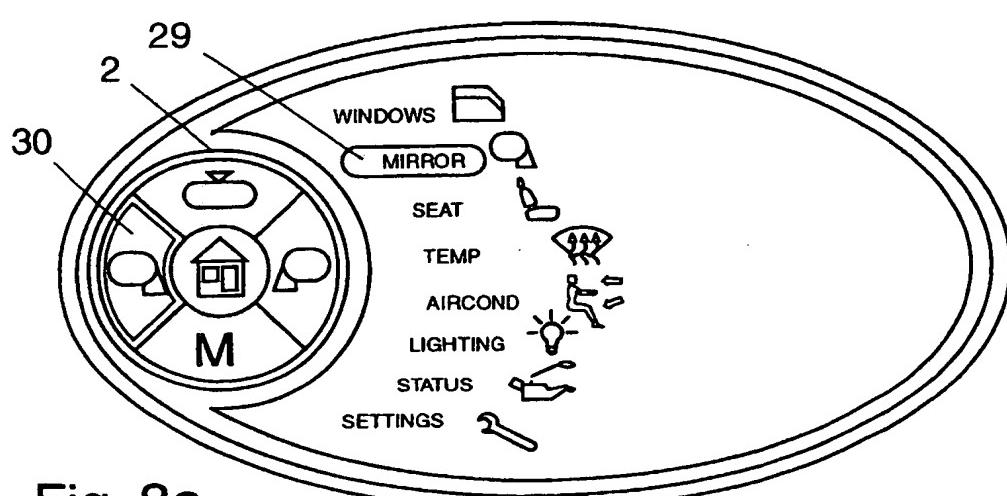
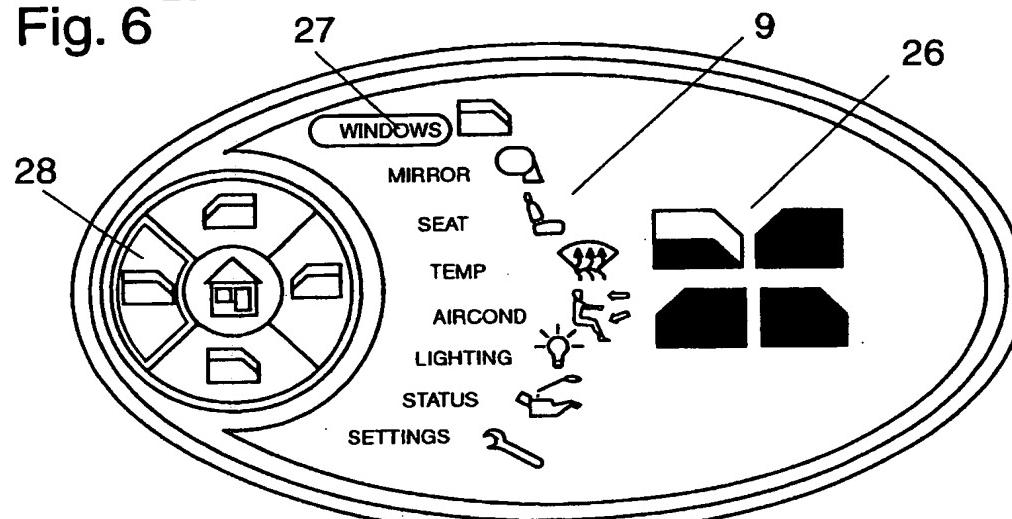
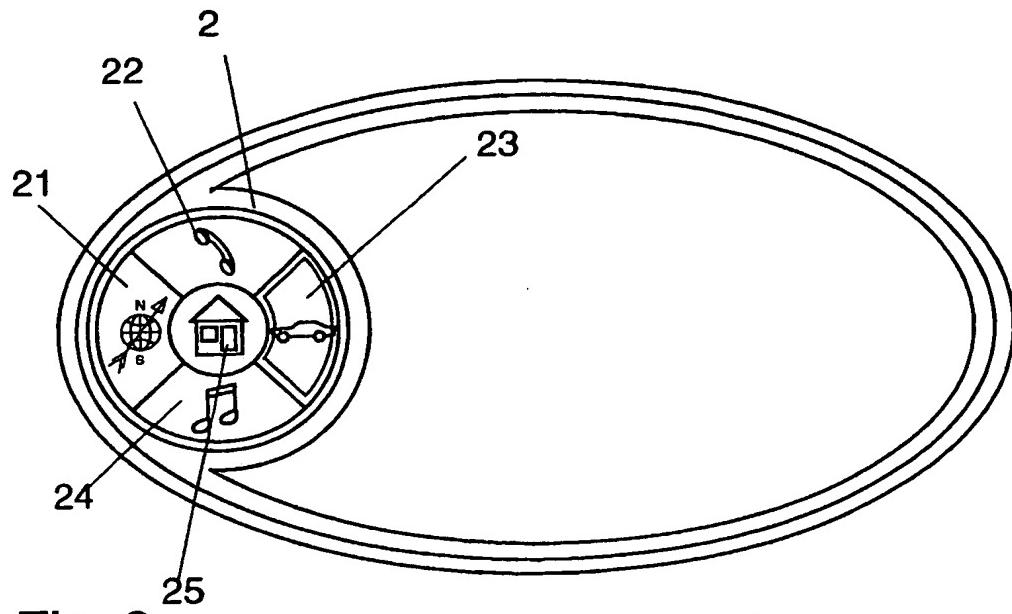


Fig 5

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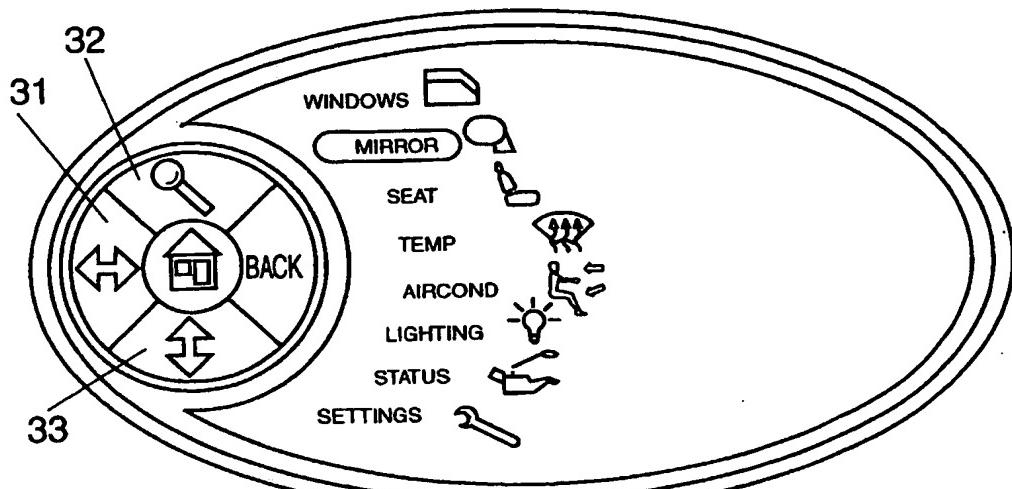


Fig. 8b

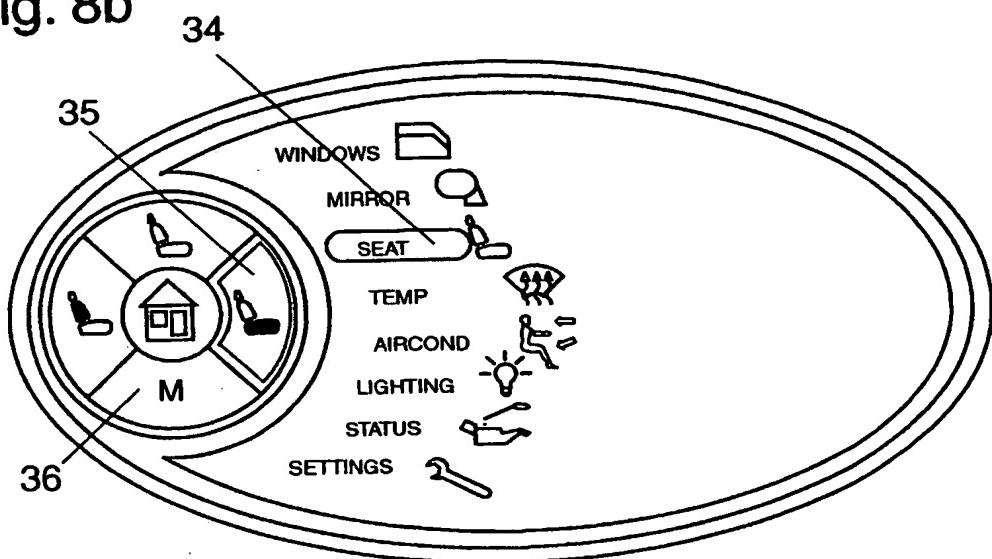


Fig. 9a

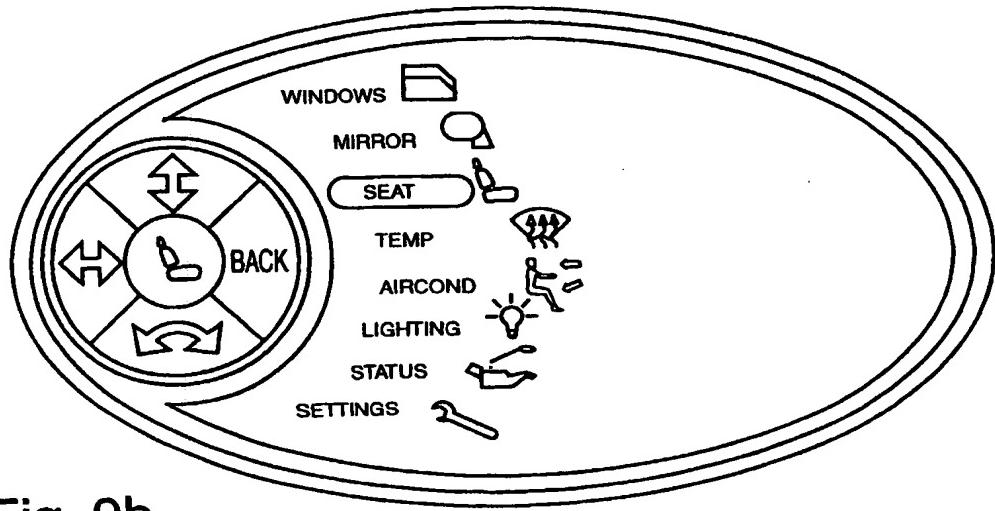


Fig. 9b

5/56

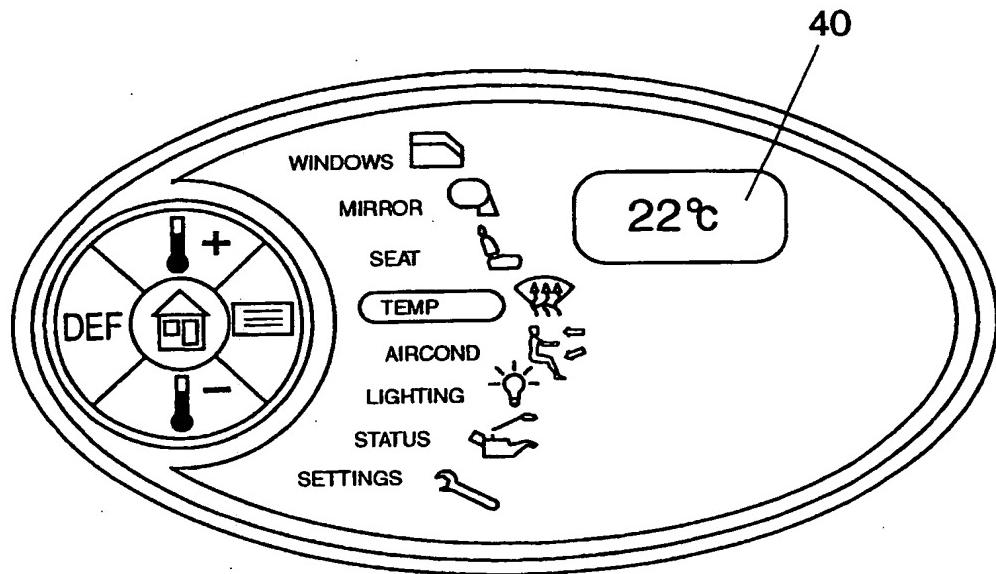


Fig. 10

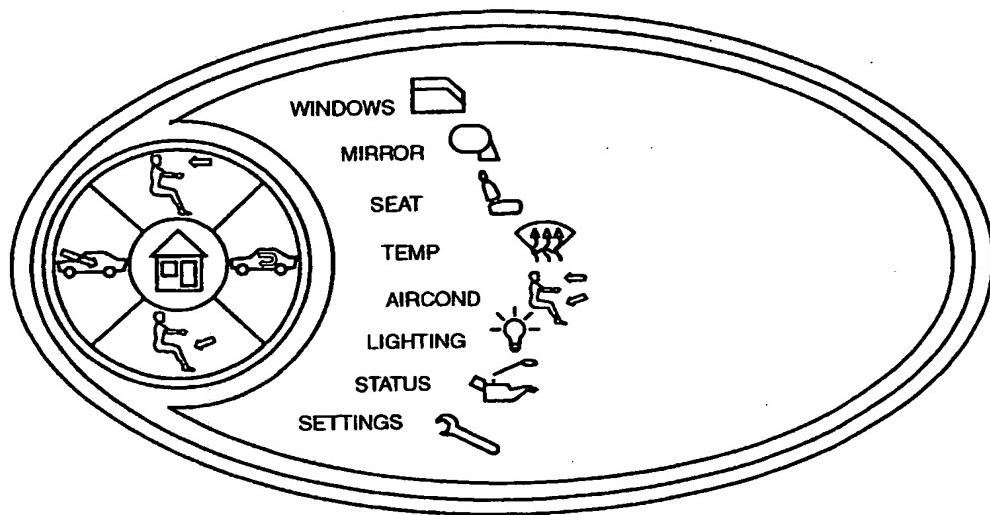


Fig. 11

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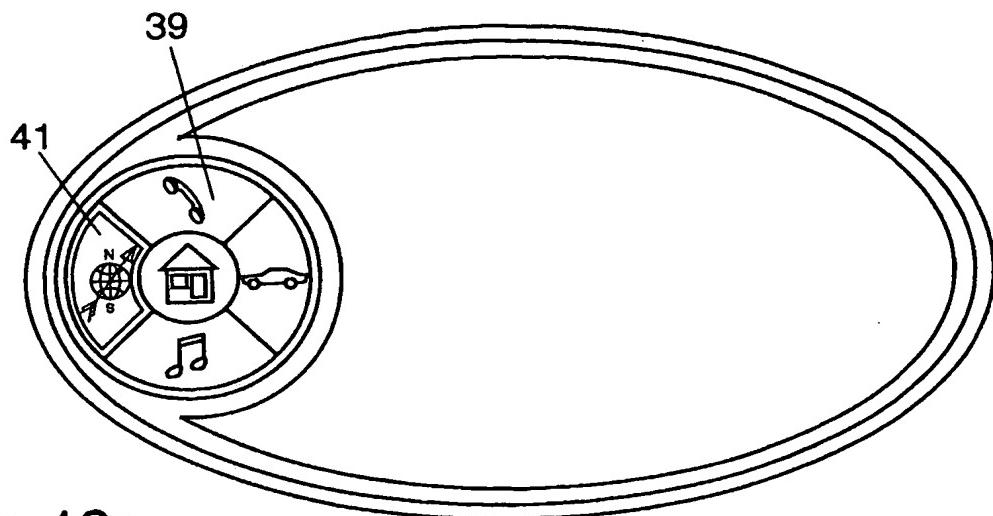


Fig. 12a

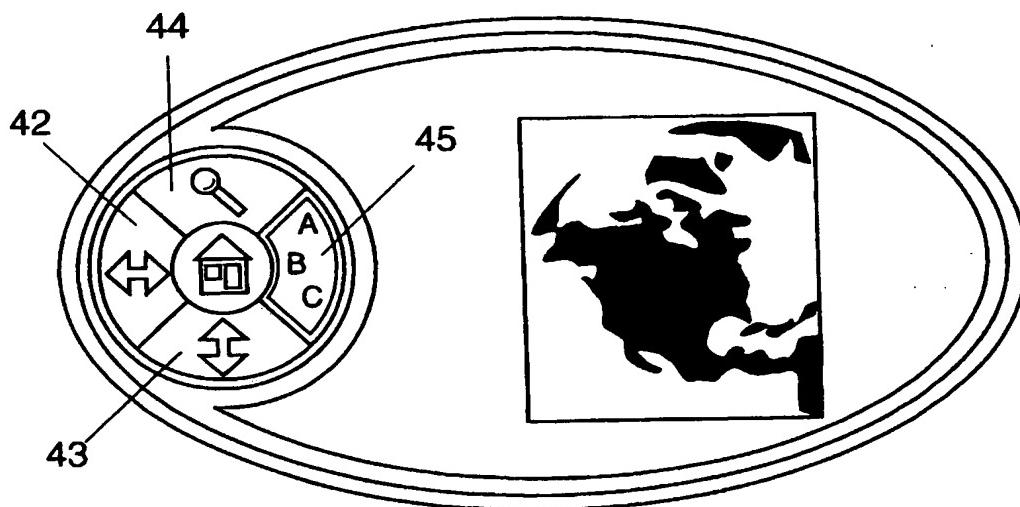


Fig. 12b

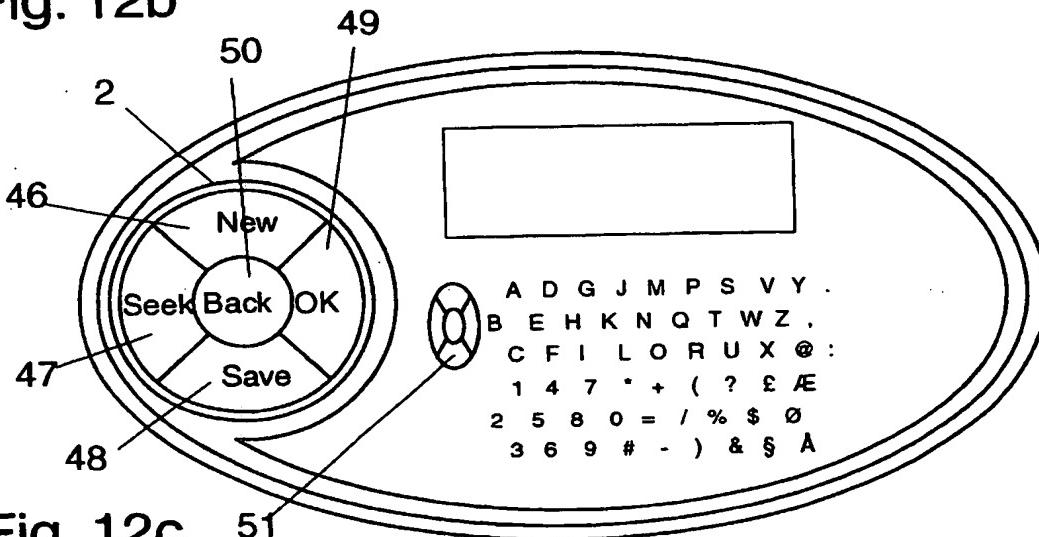


Fig. 12c

7/56

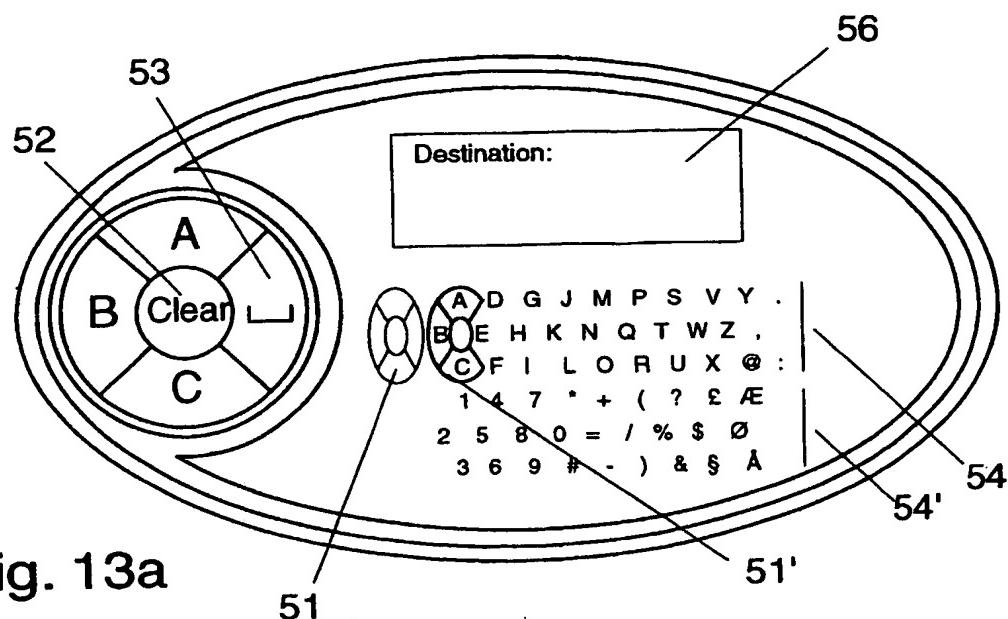


Fig. 13a

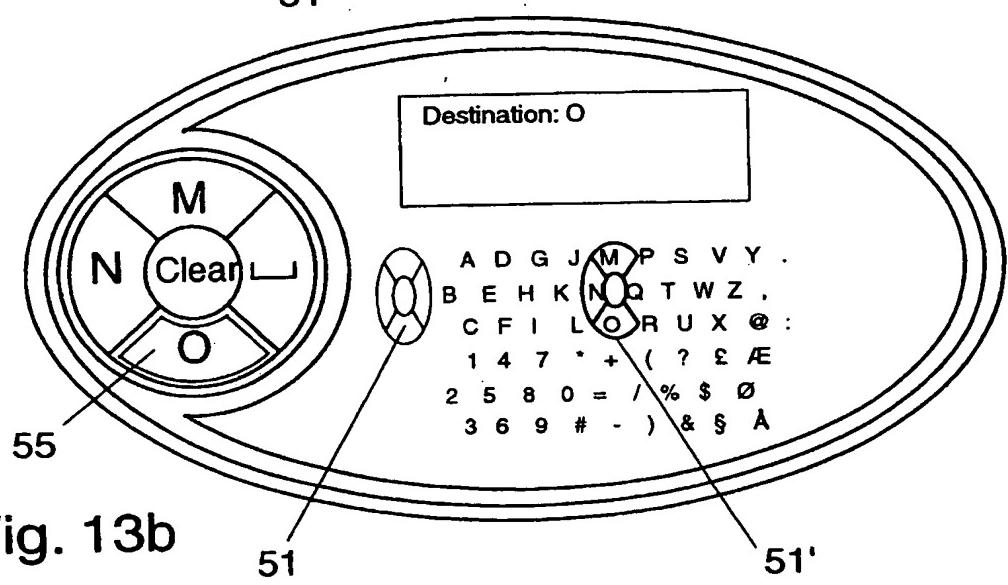


Fig. 13b

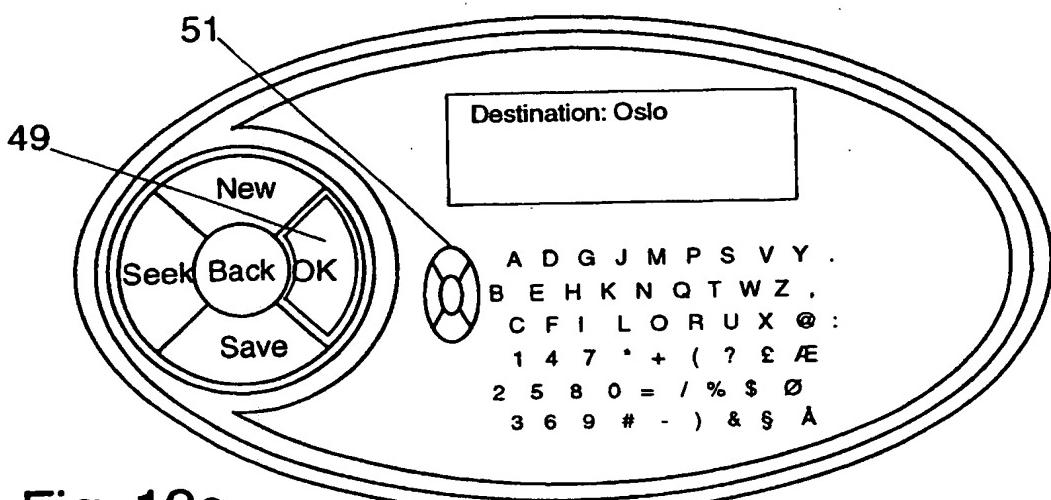


Fig. 13c

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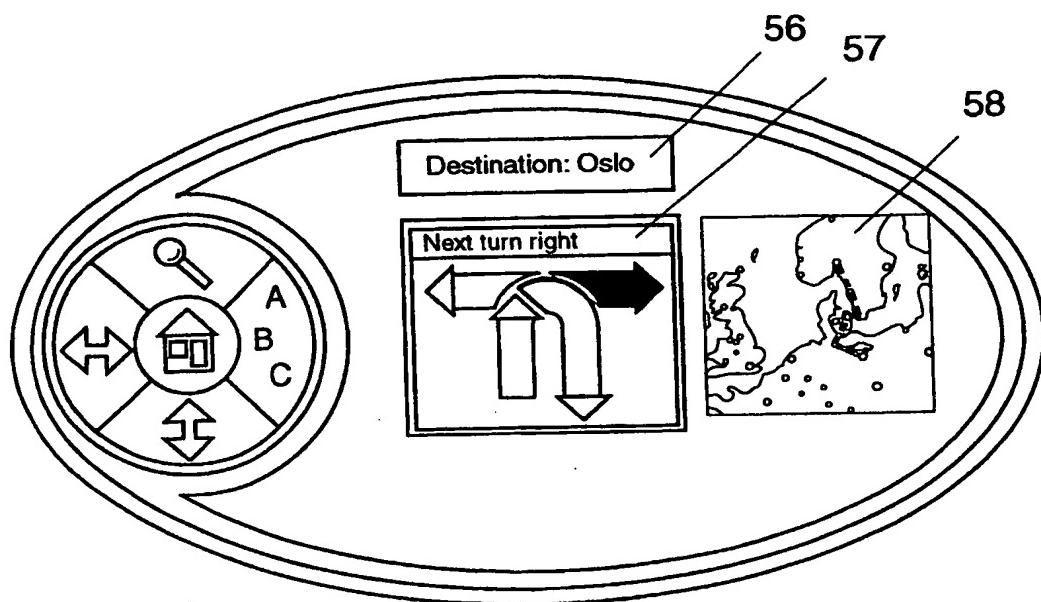


Fig. 13d

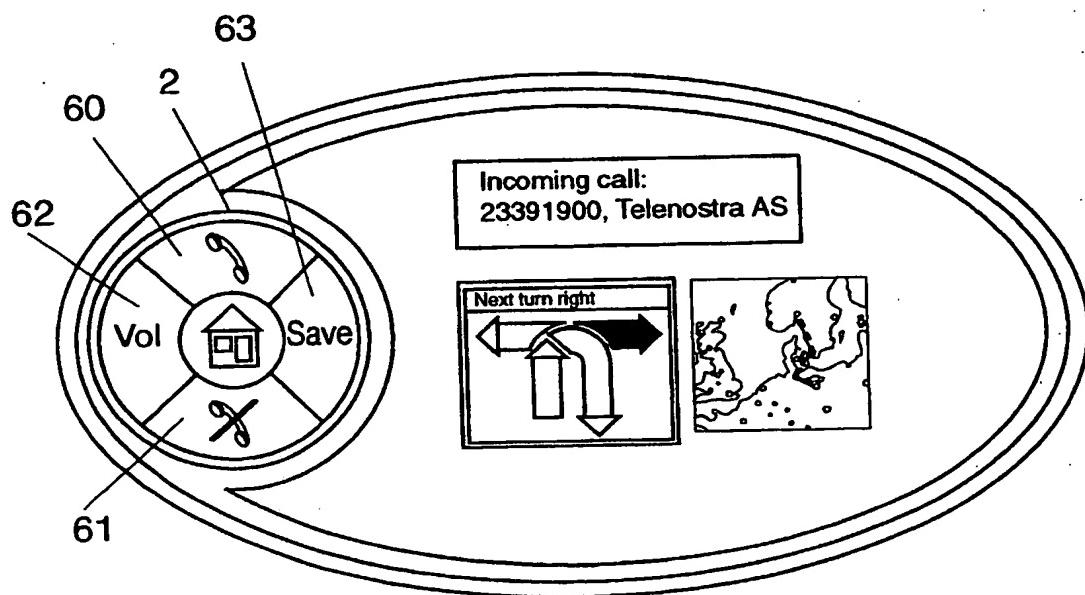


Fig. 14

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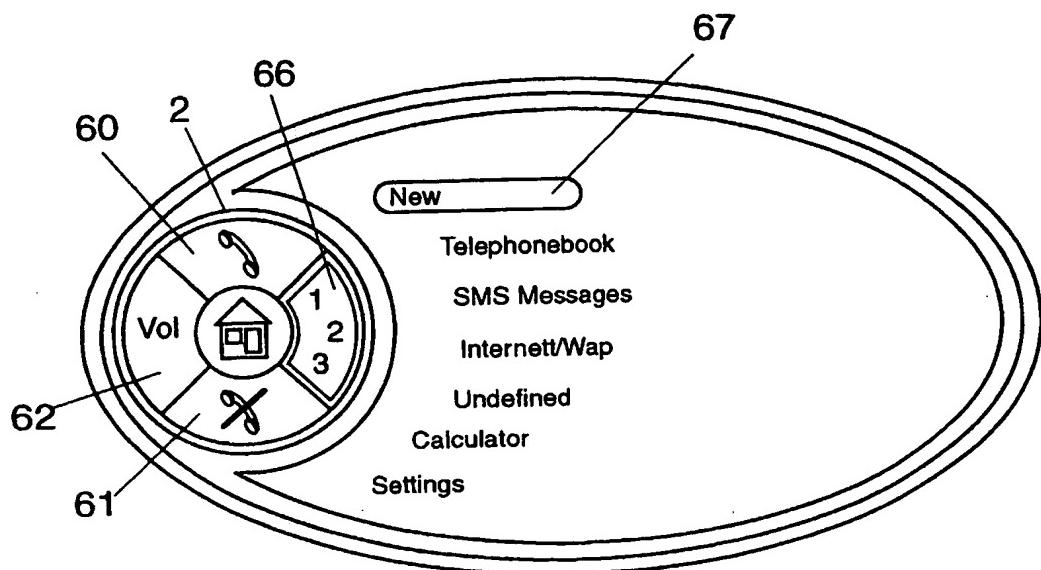


Fig. 15a

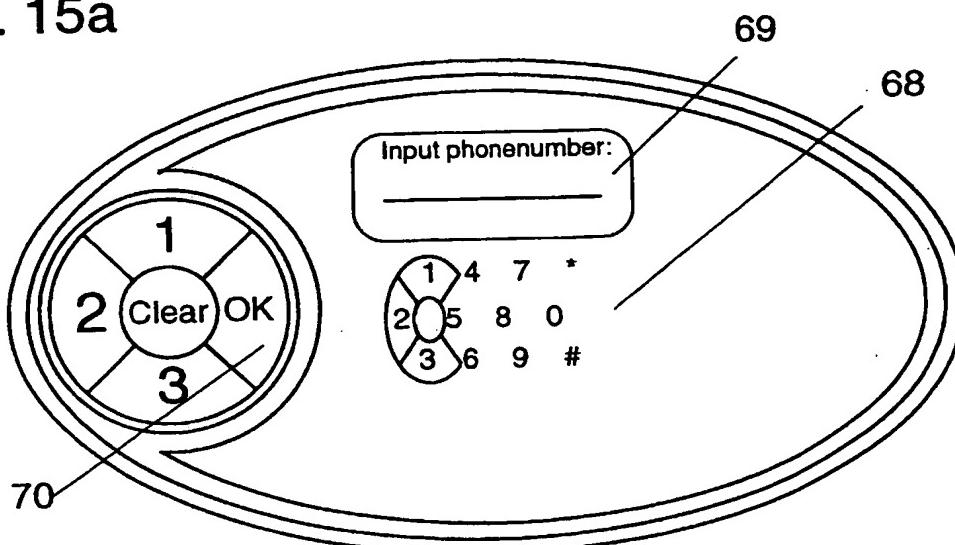


Fig. 15b

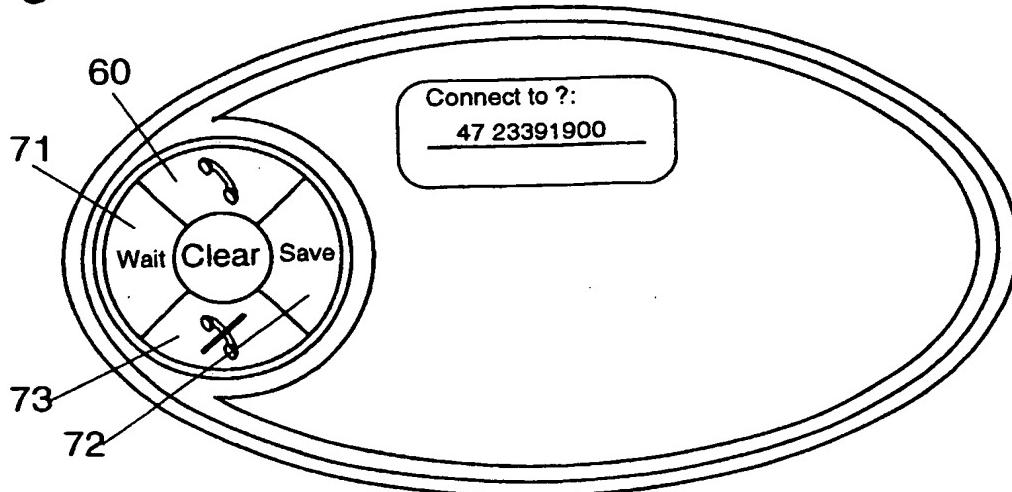


Fig. 15c

10/56

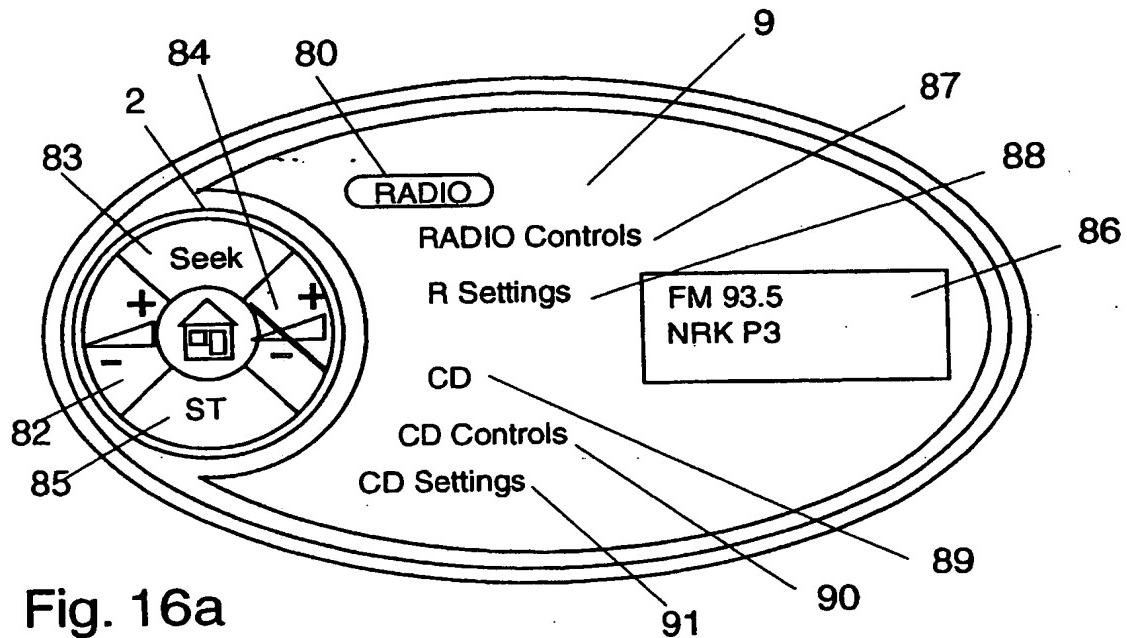


Fig. 16a

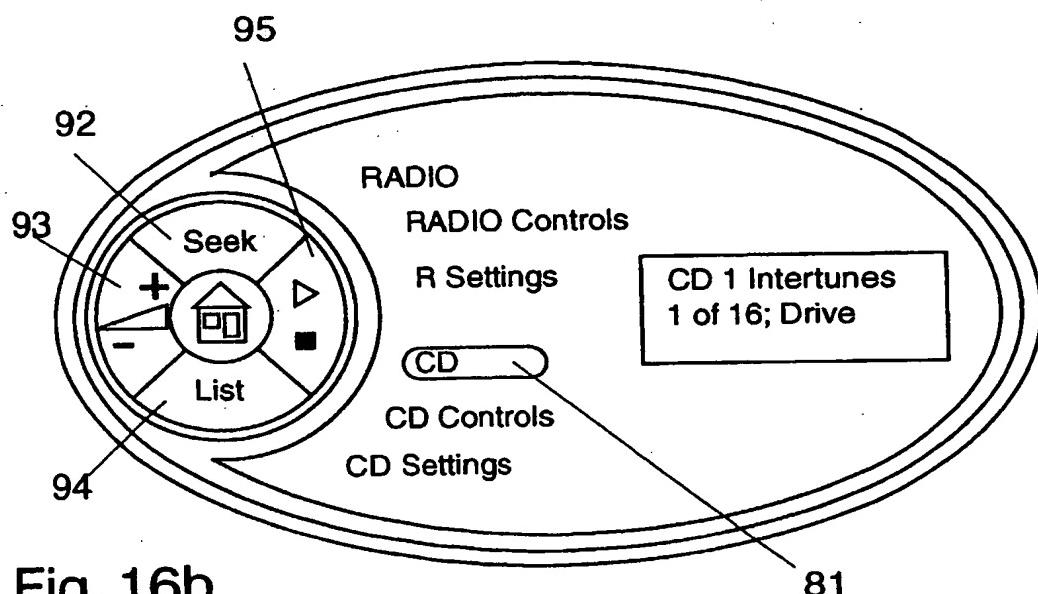


Fig. 16b

11/56

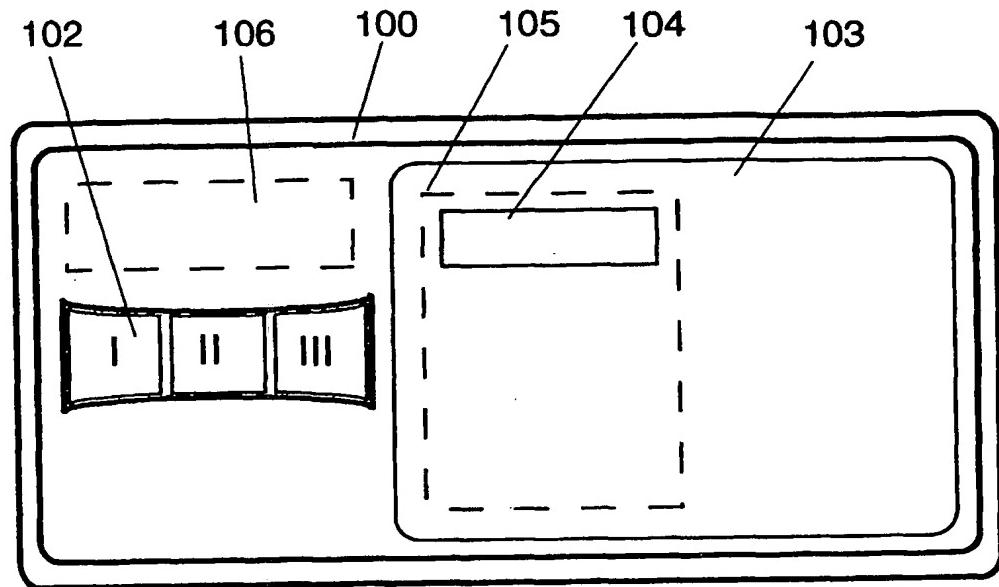


Fig. 17a

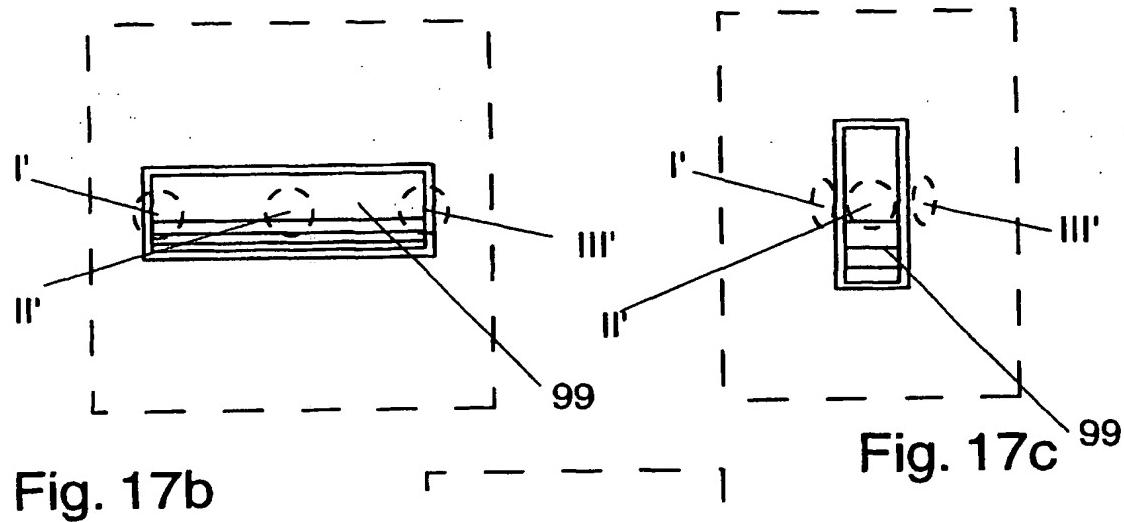


Fig. 17b

Fig. 17c 99

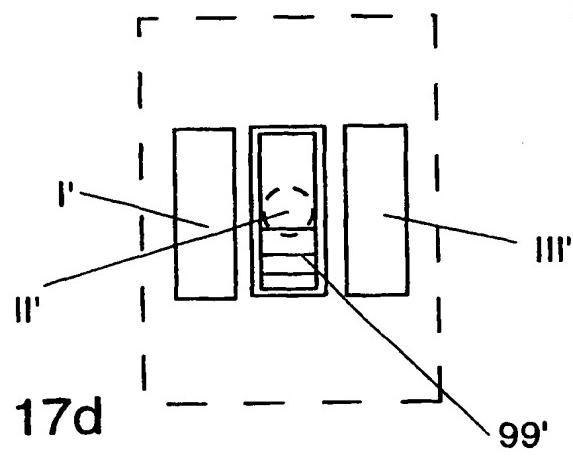


Fig. 17d

12/56

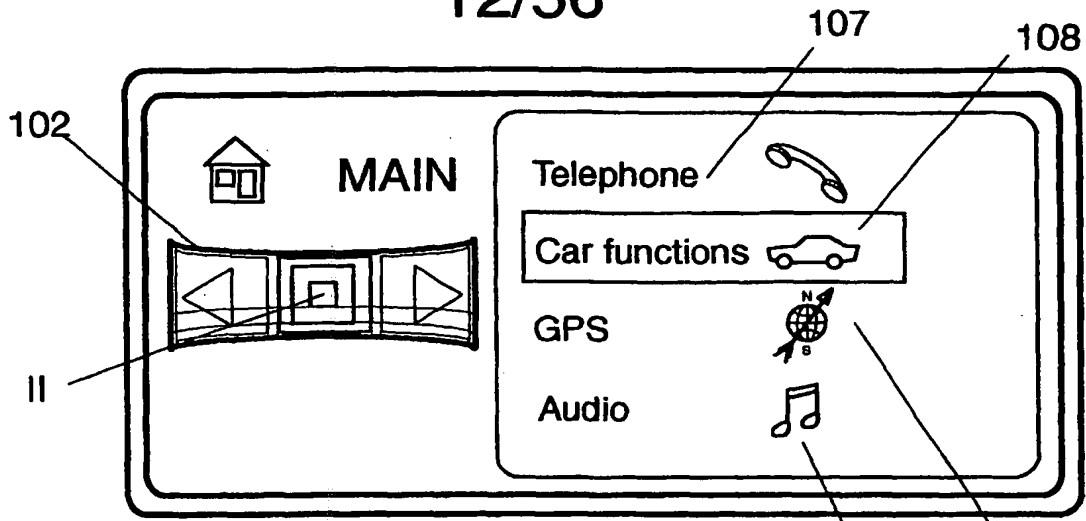


Fig. 18a

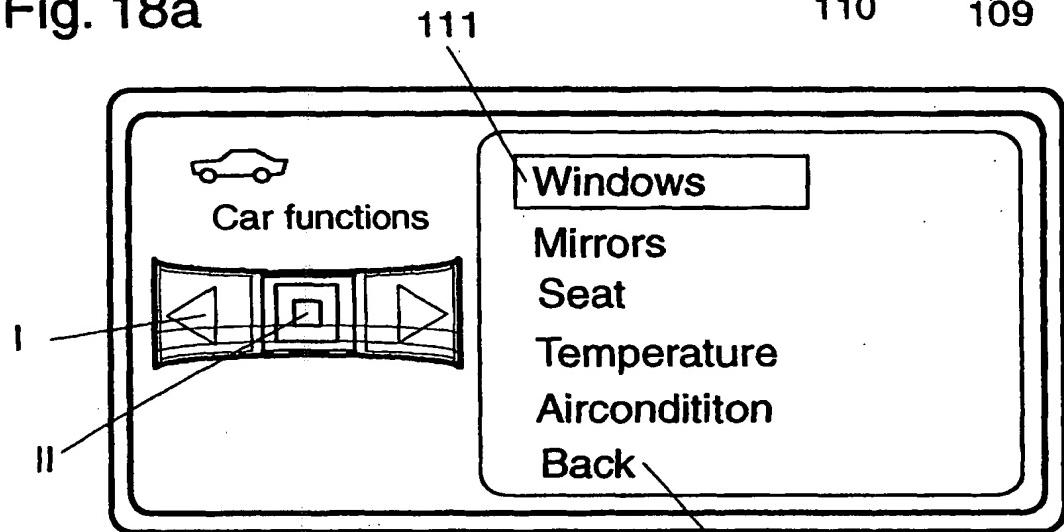


Fig. 18b

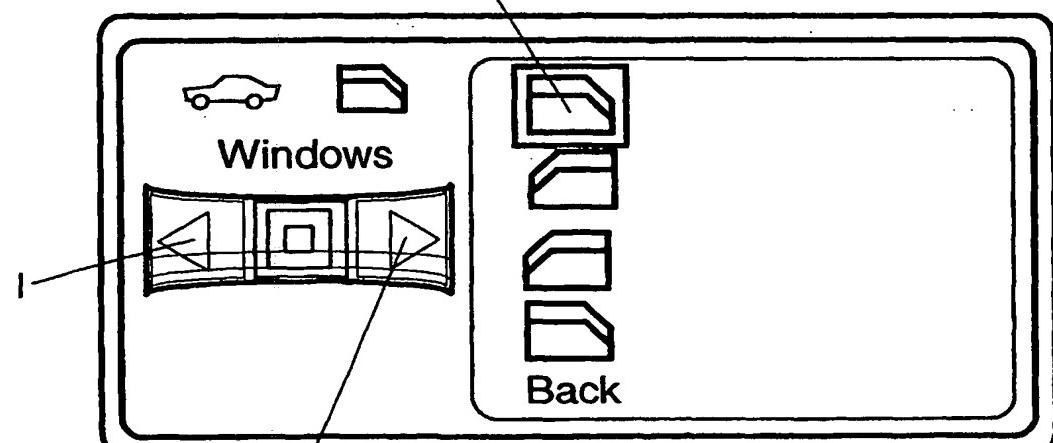


Fig. 18c

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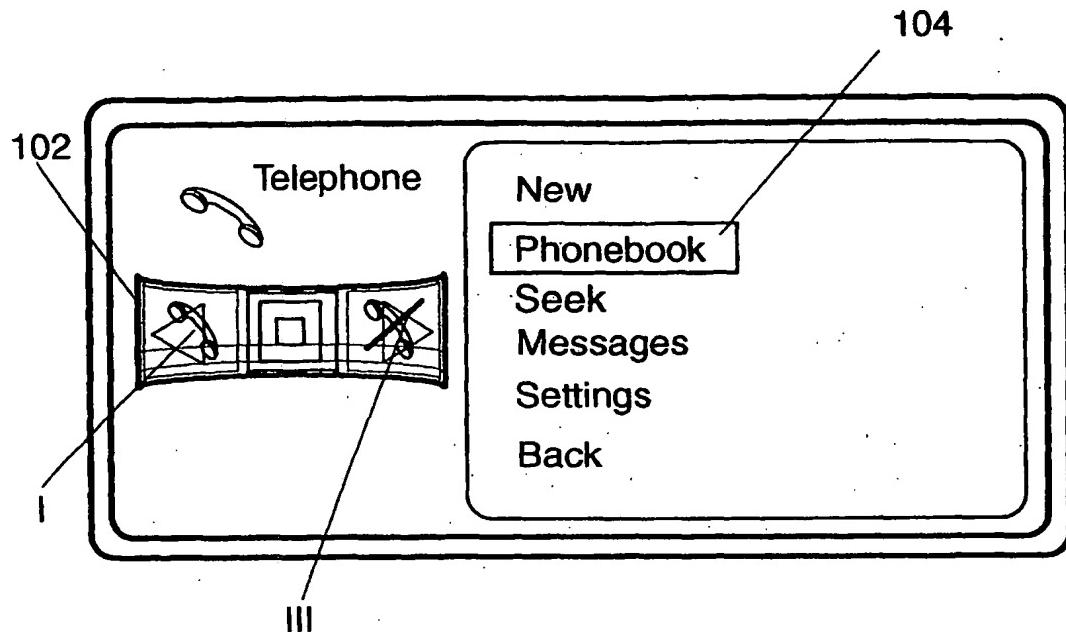


Fig. 19a

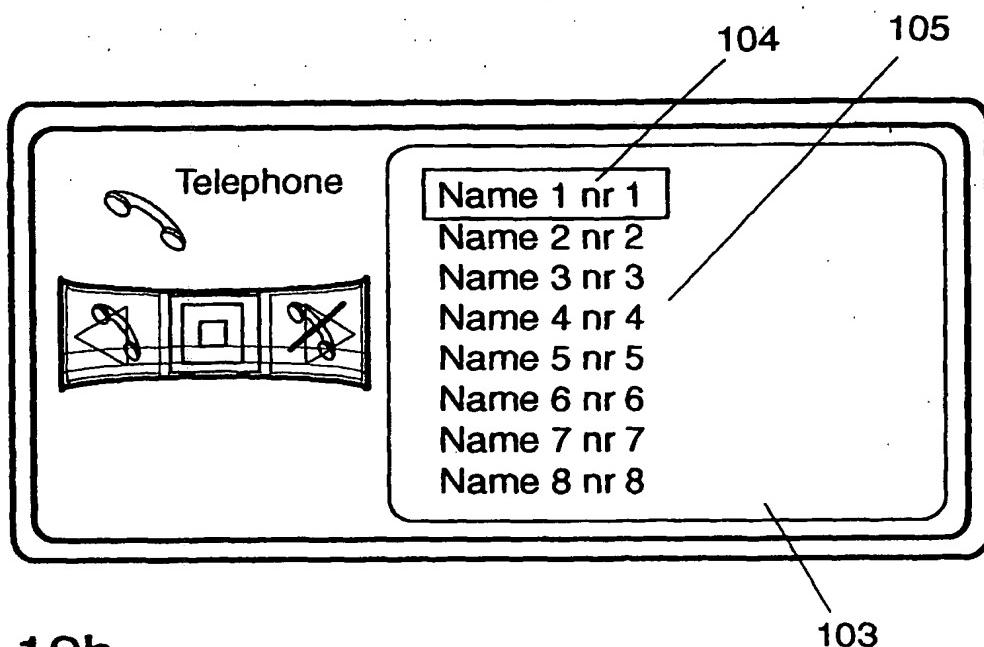


Fig. 19b

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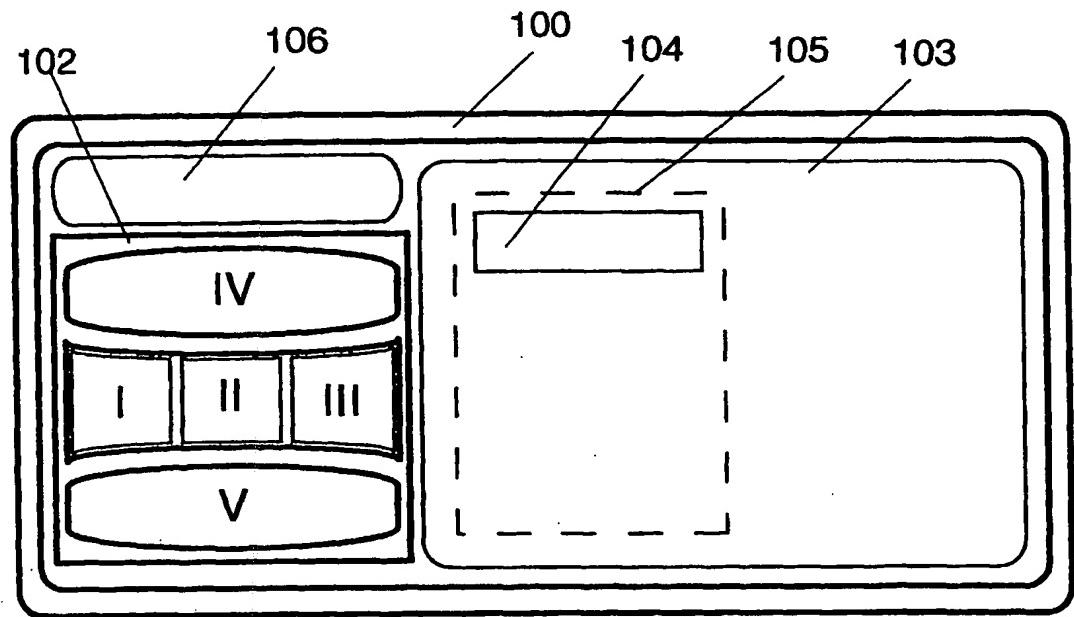


Fig. 20

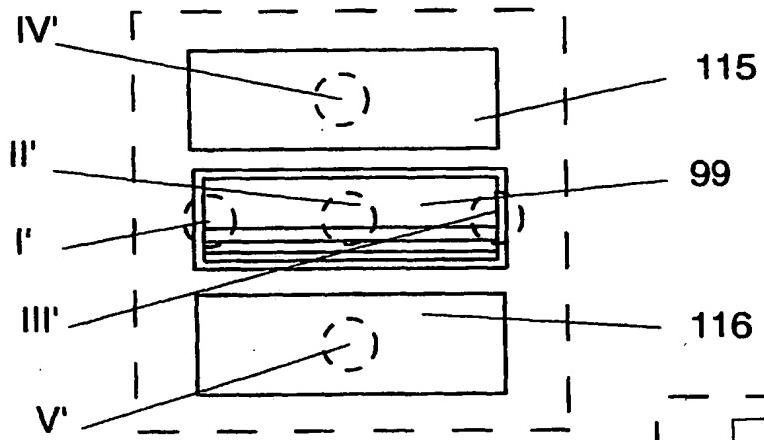


Fig. 21a

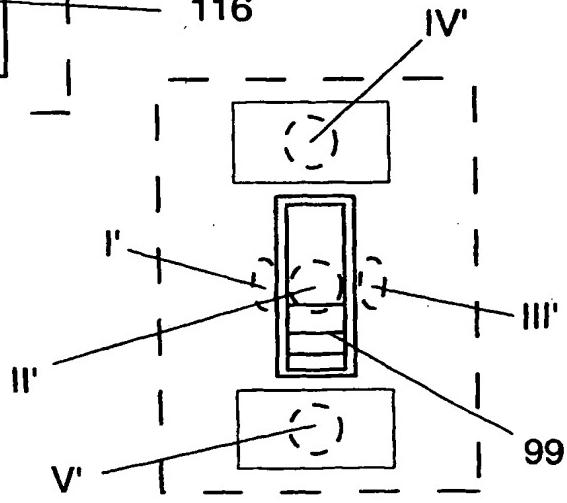


Fig. 21b

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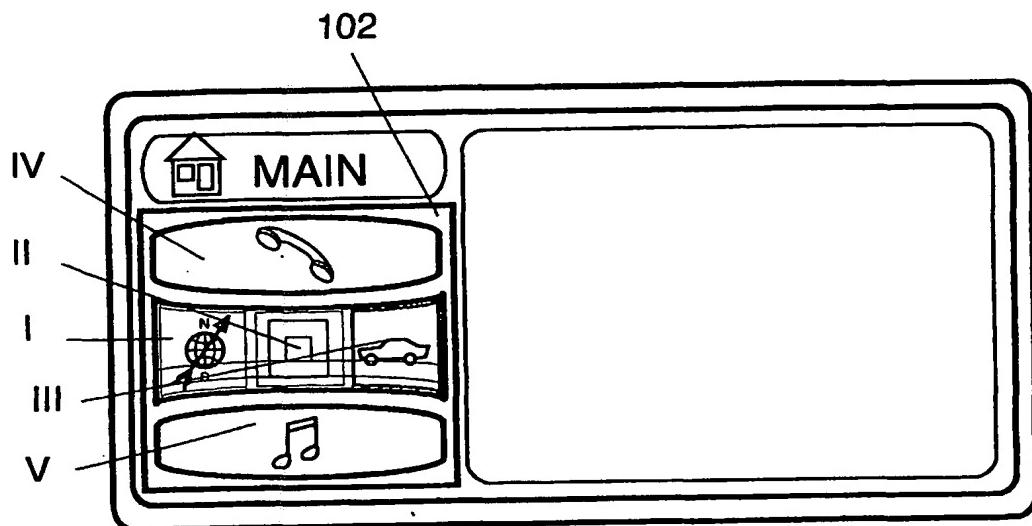


Fig. 22a

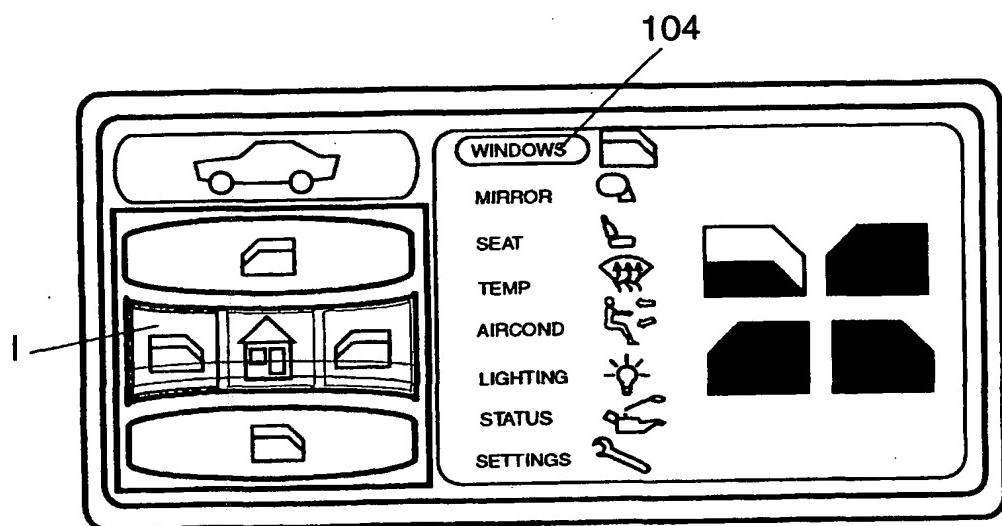


Fig. 22b

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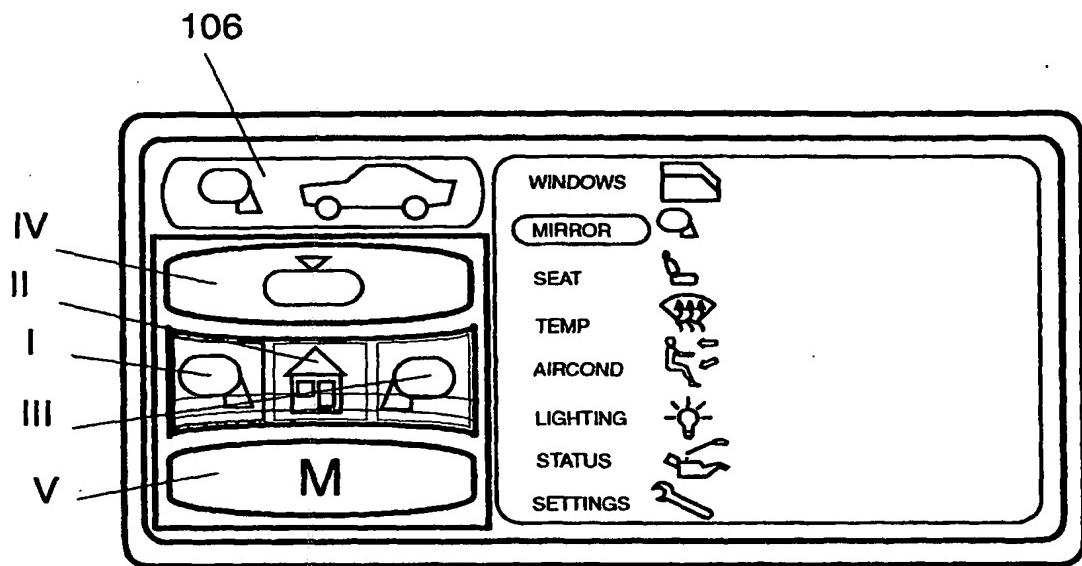


Fig. 23a

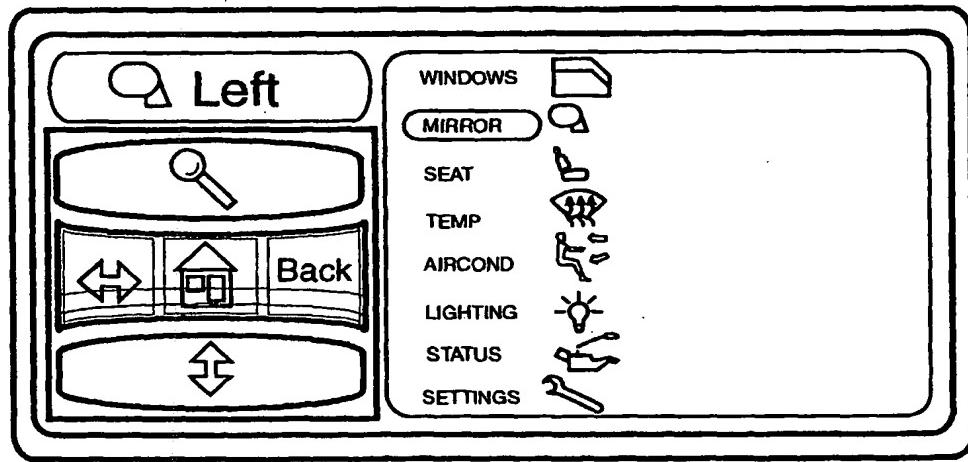


Fig. 23b

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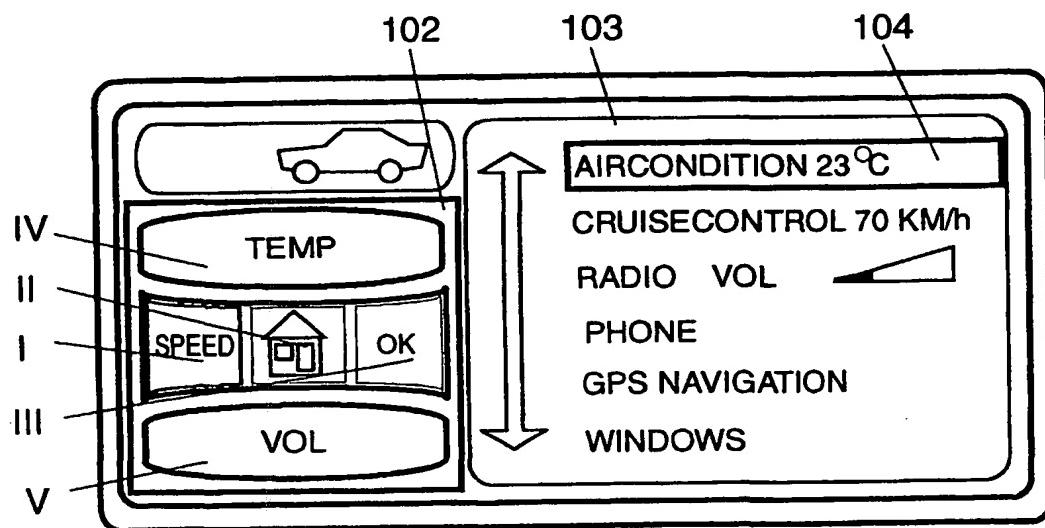


Fig. 24a

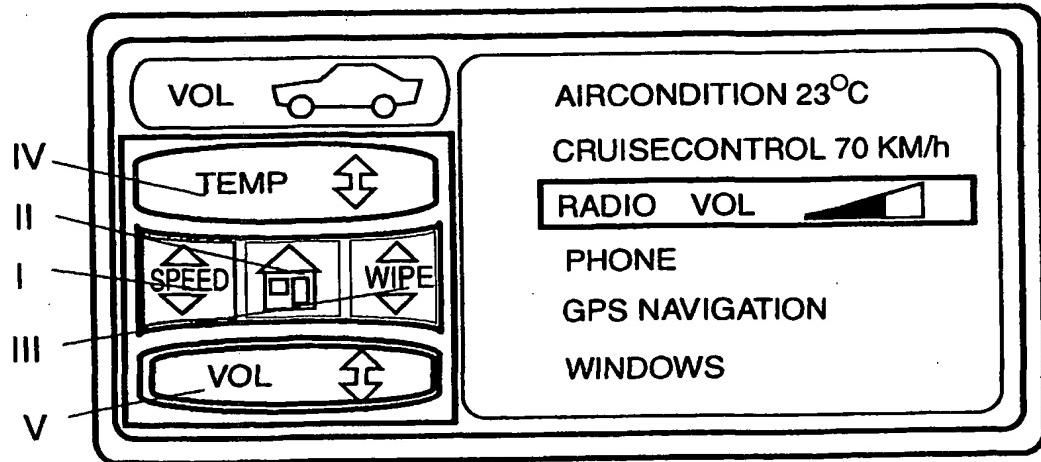


Fig. 24b

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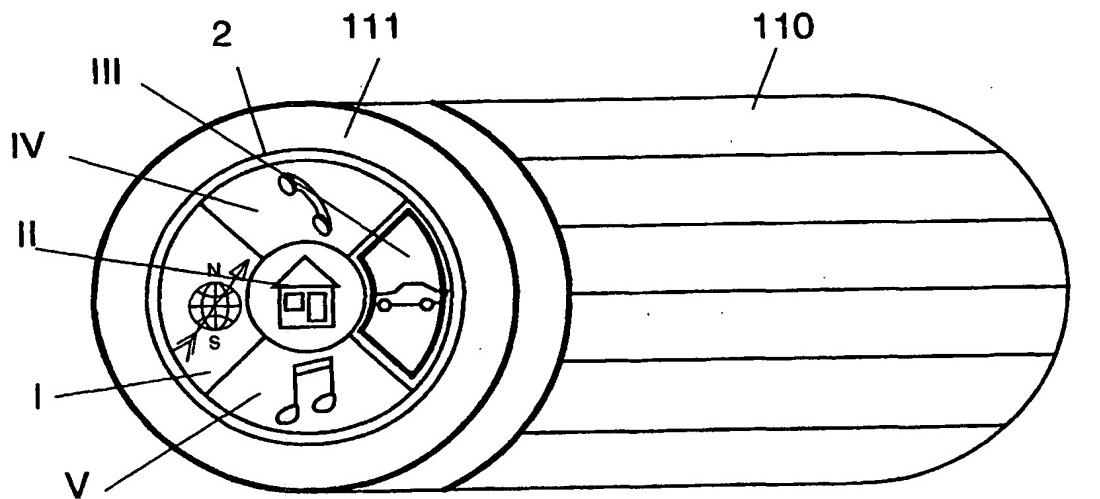


Fig.25a

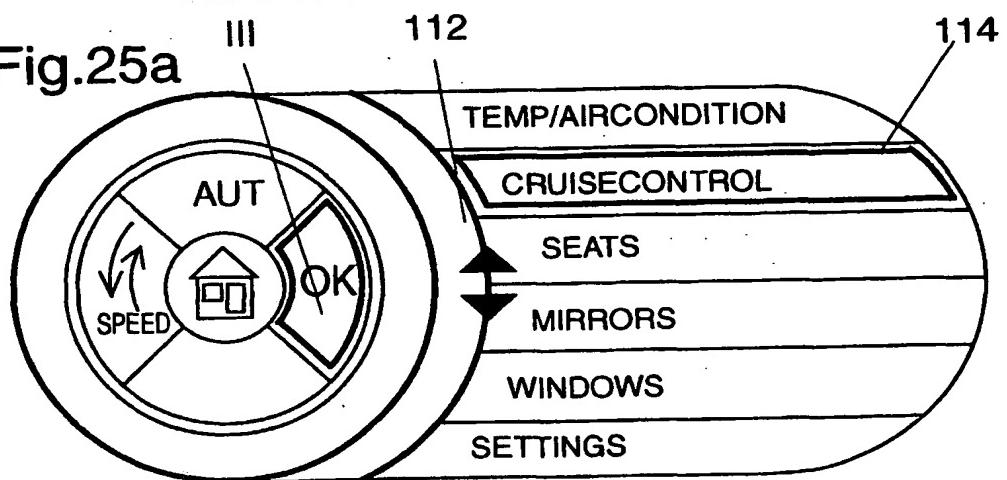


Fig.25b

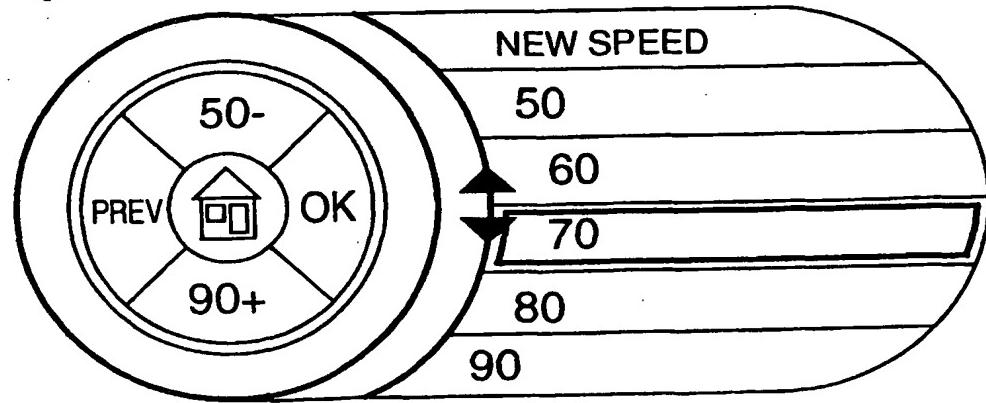


Fig.25c

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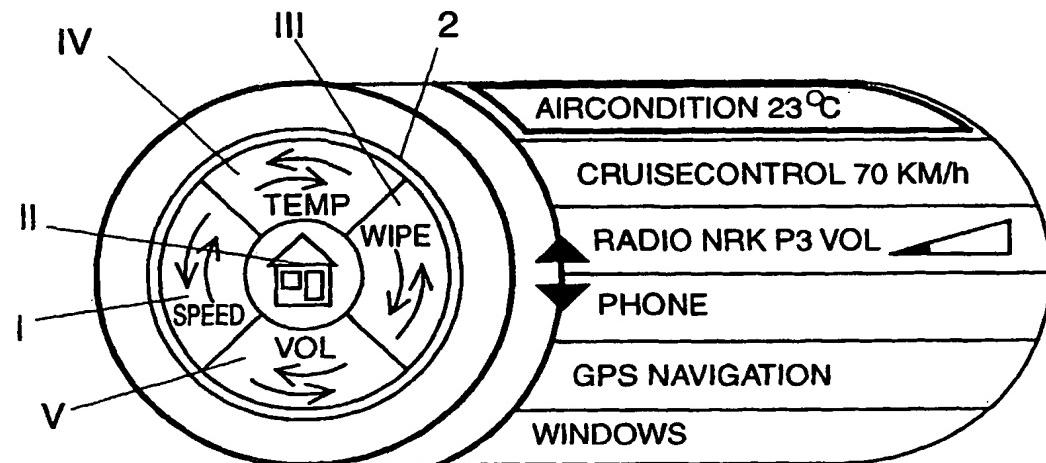


Fig.26a

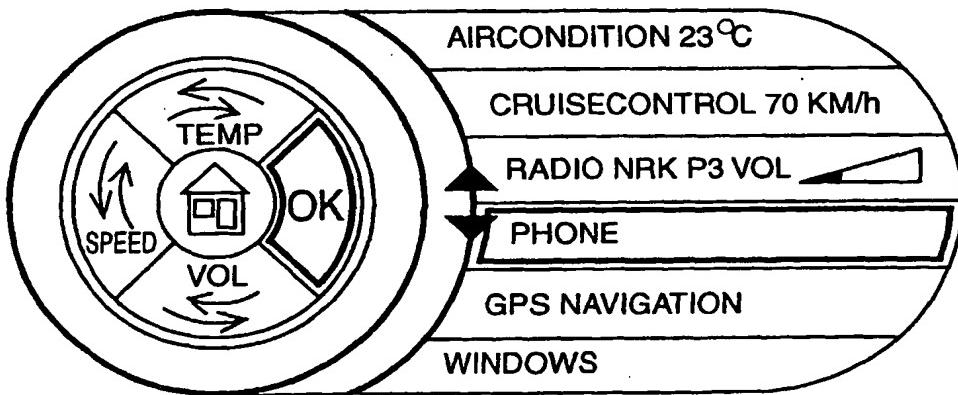


Fig.26b

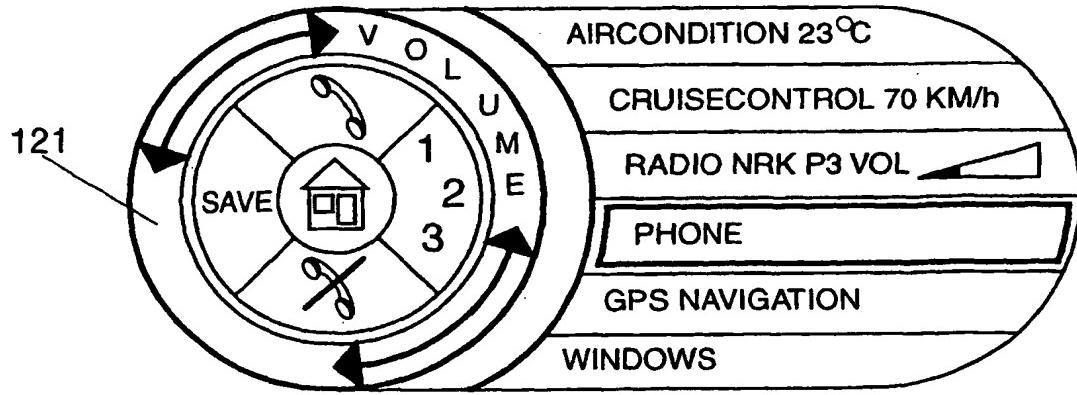


Fig.26c

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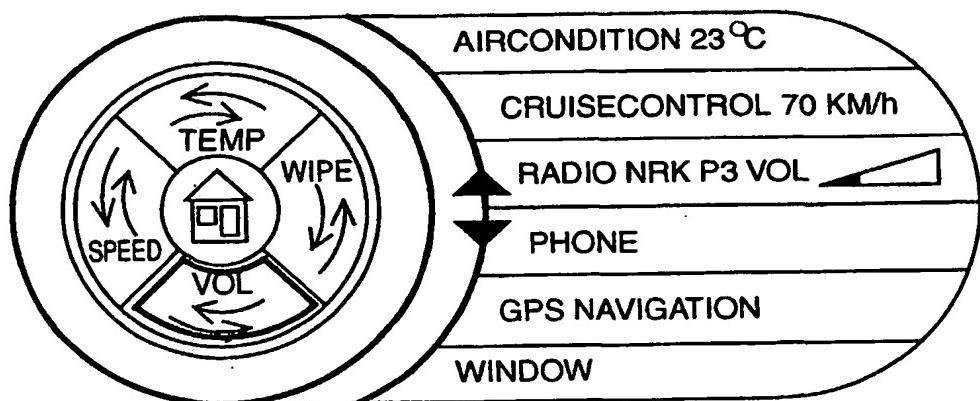


Fig.26d

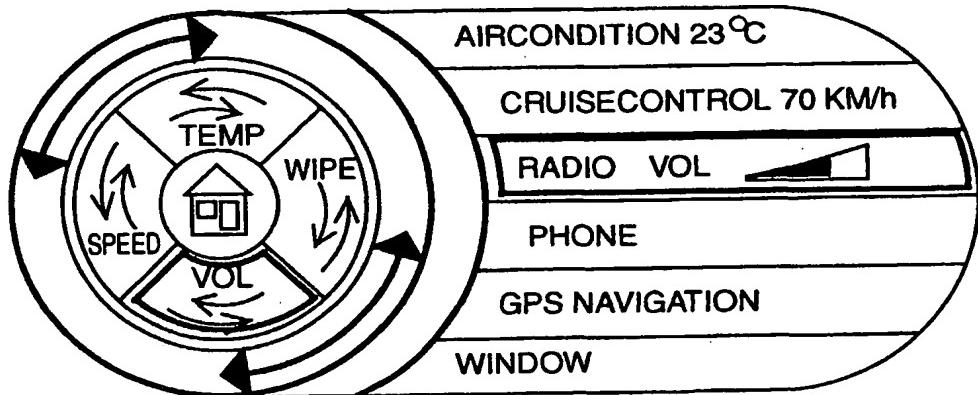


Fig.26e

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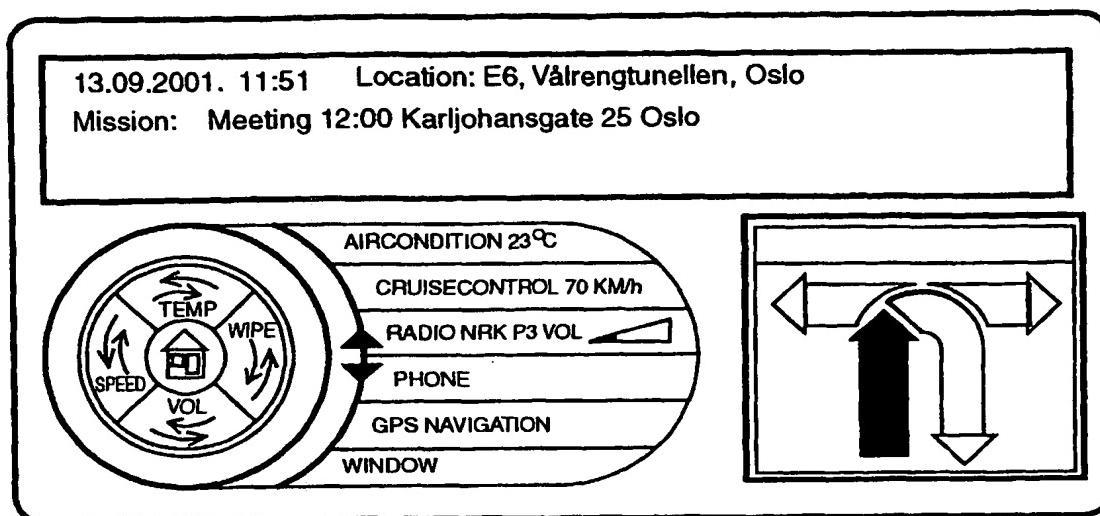


Fig.27a

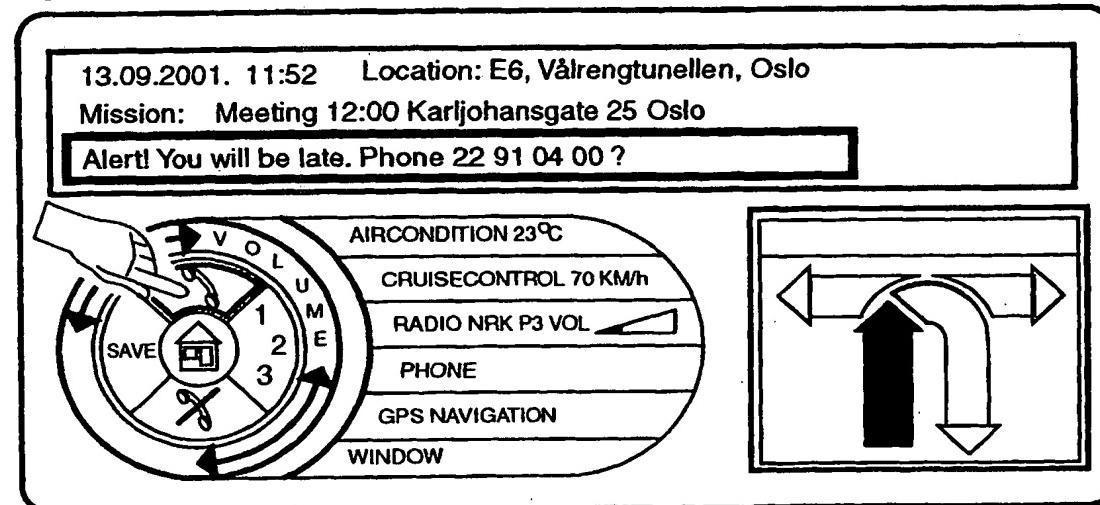


Fig.27b

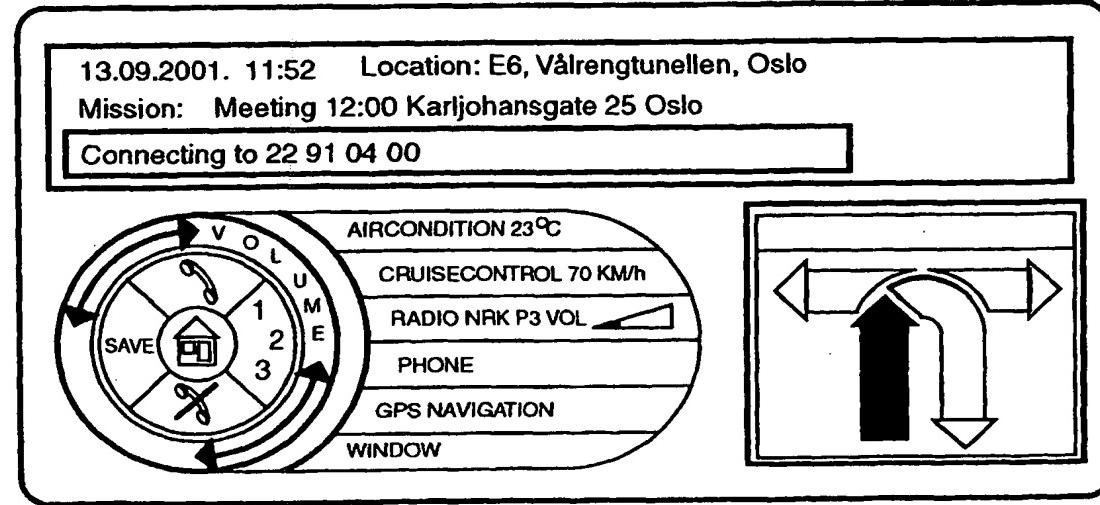


Fig.27c

22/56

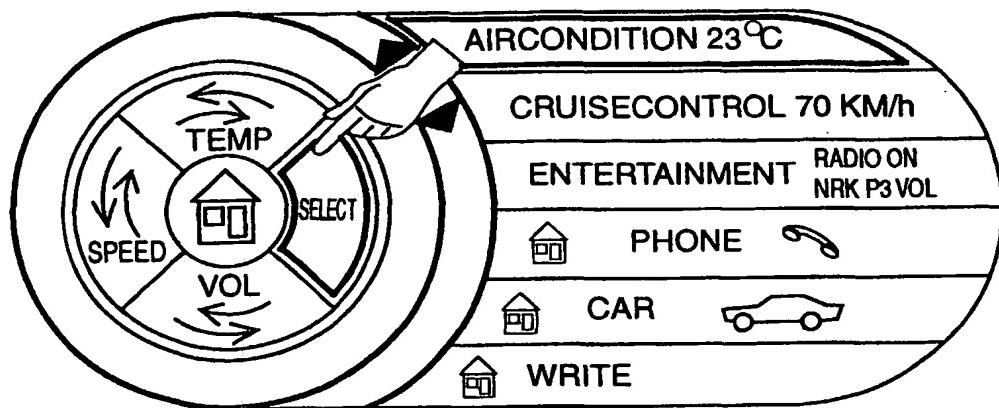


Fig. 28a

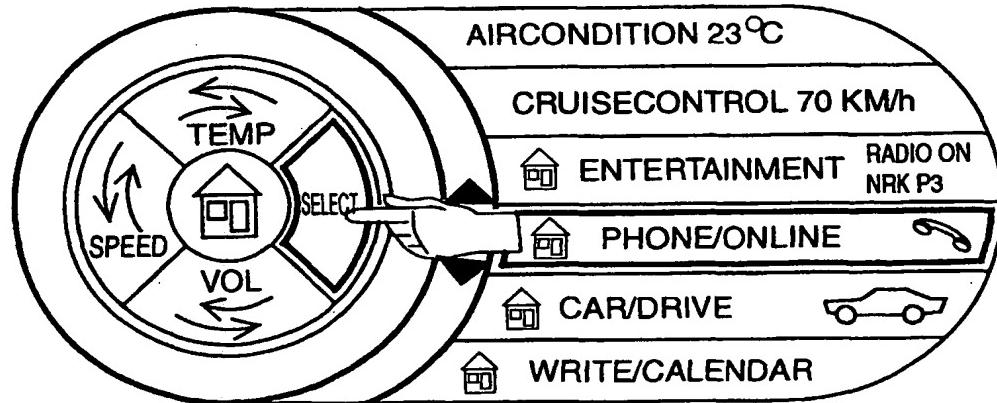


Fig. 28b

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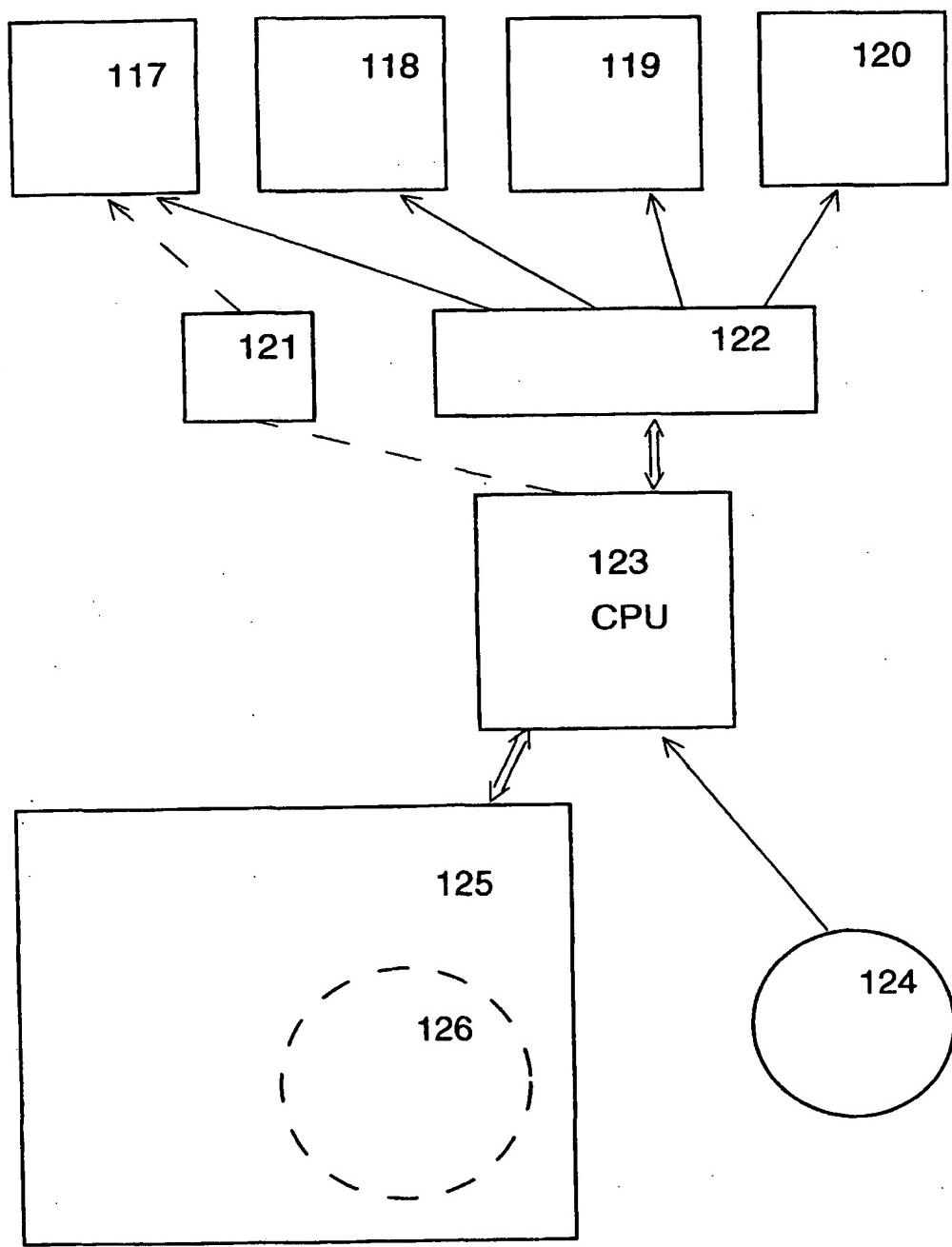


Fig. 29a

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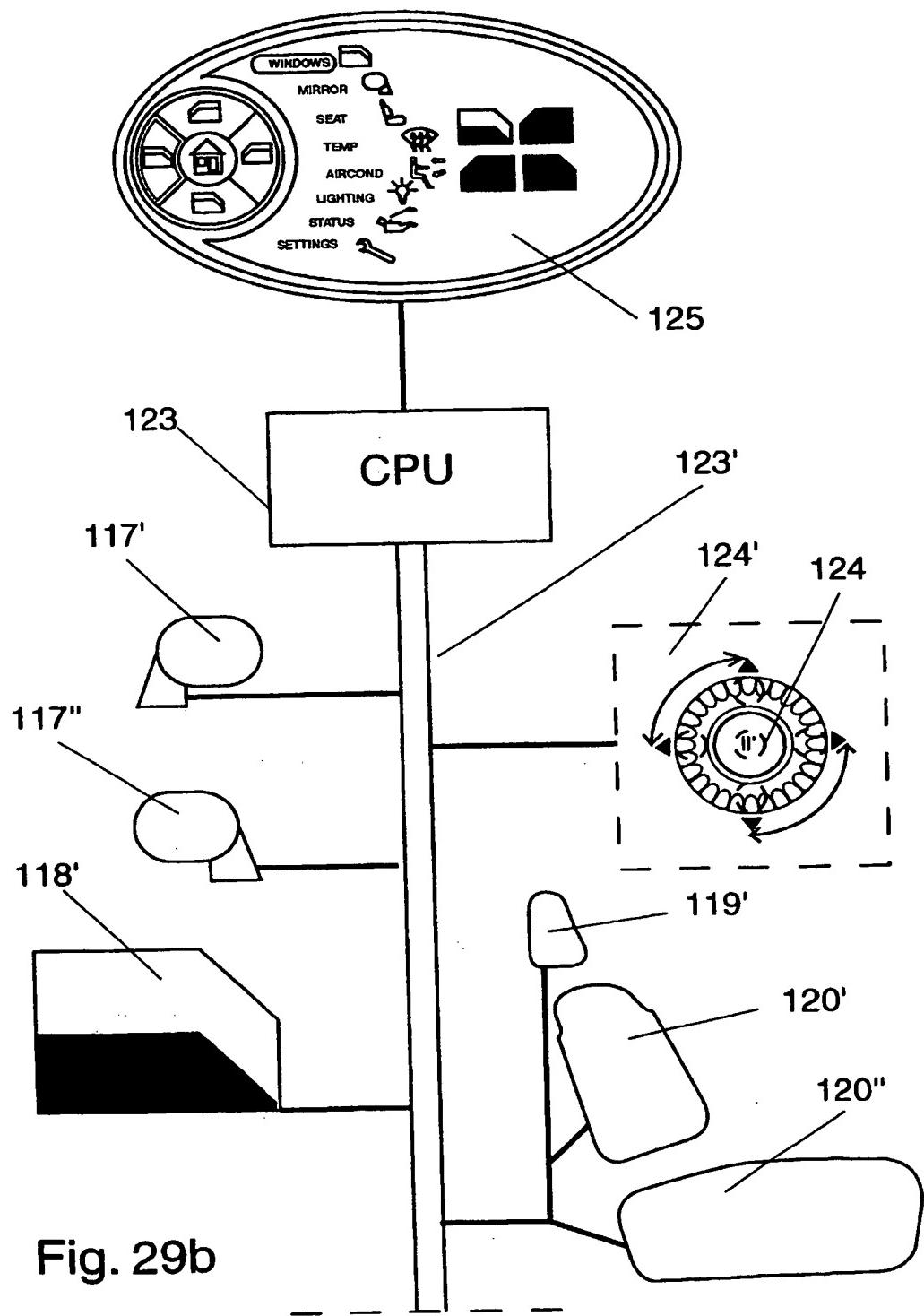


Fig. 29b

25/56

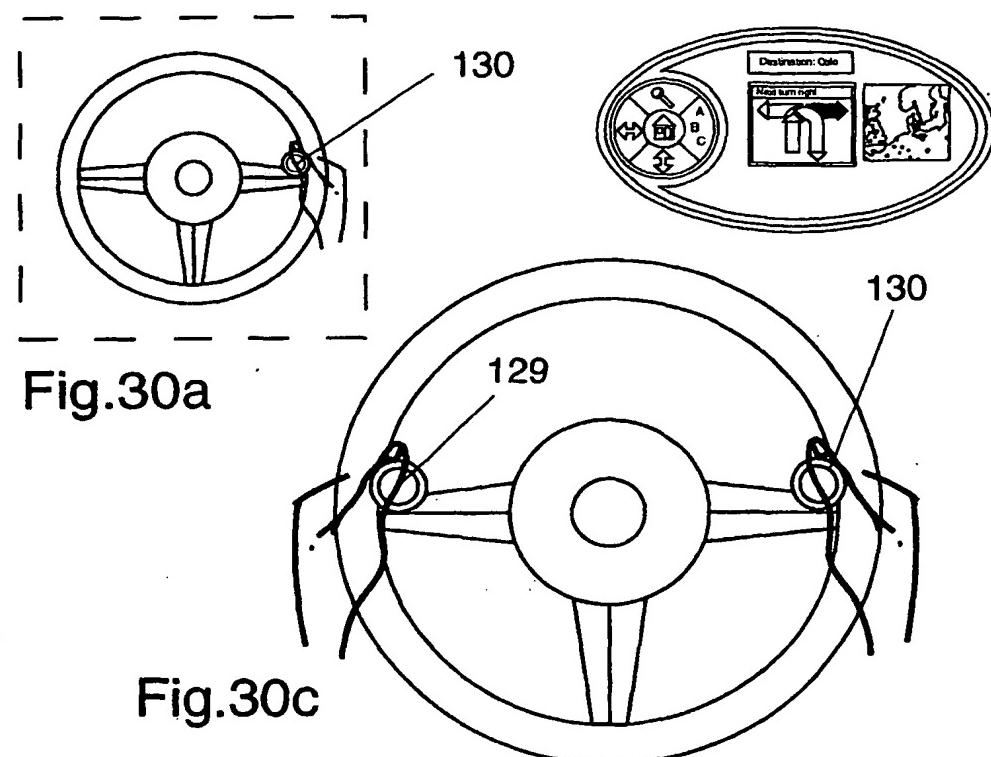


Fig.30a

Fig.30c

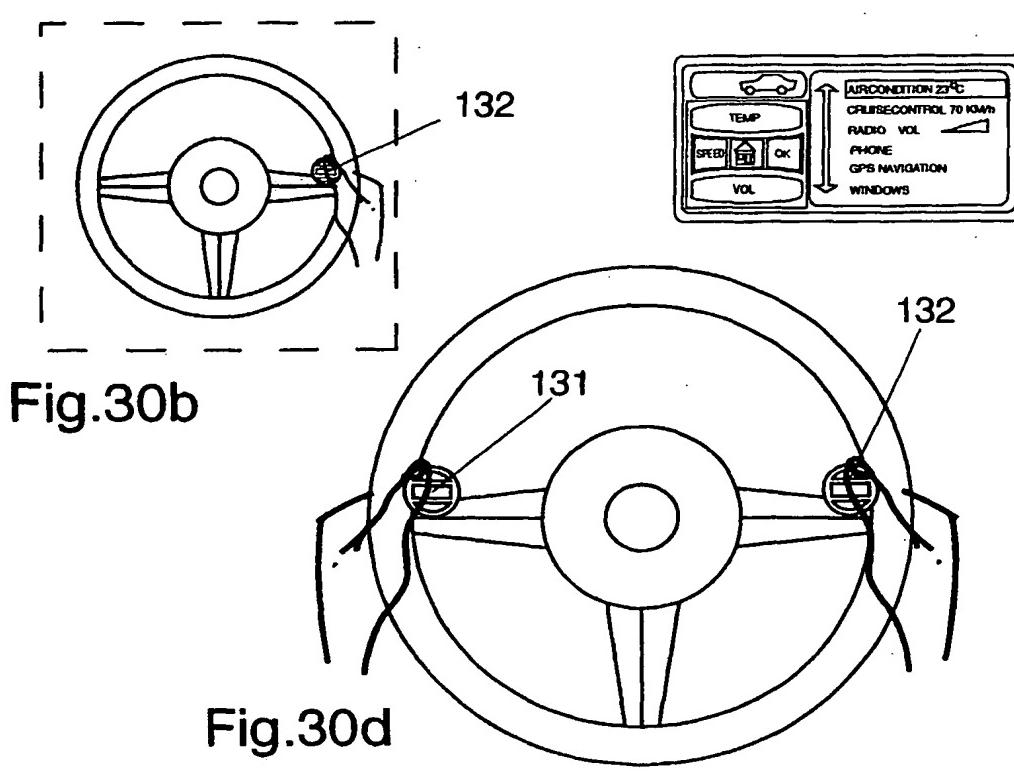


Fig.30b

Fig.30d

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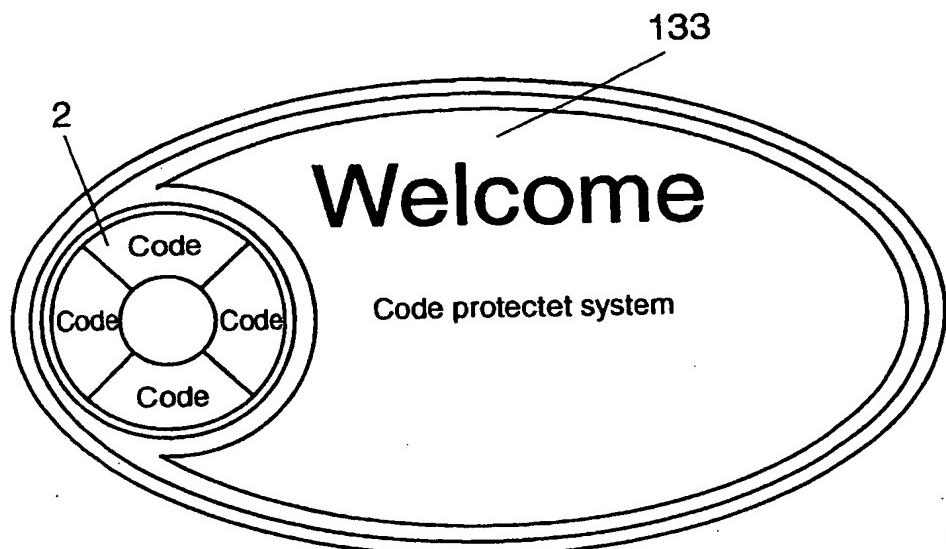


Fig. 31a

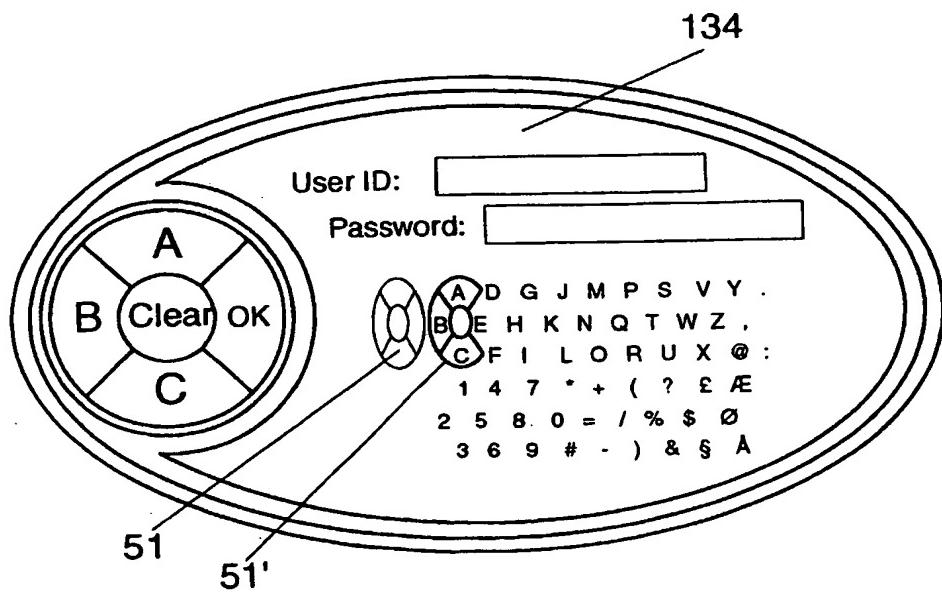


Fig. 31b

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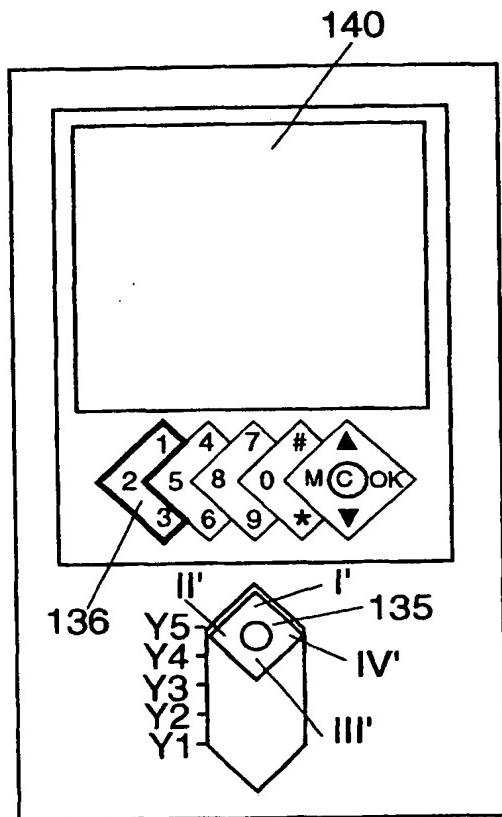


Fig. 32a

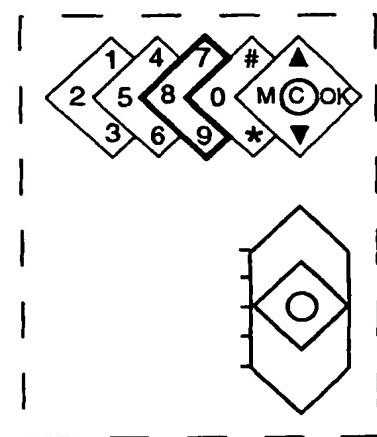


Fig. 32b

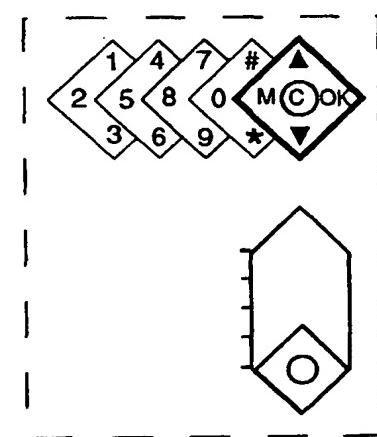


Fig. 32c

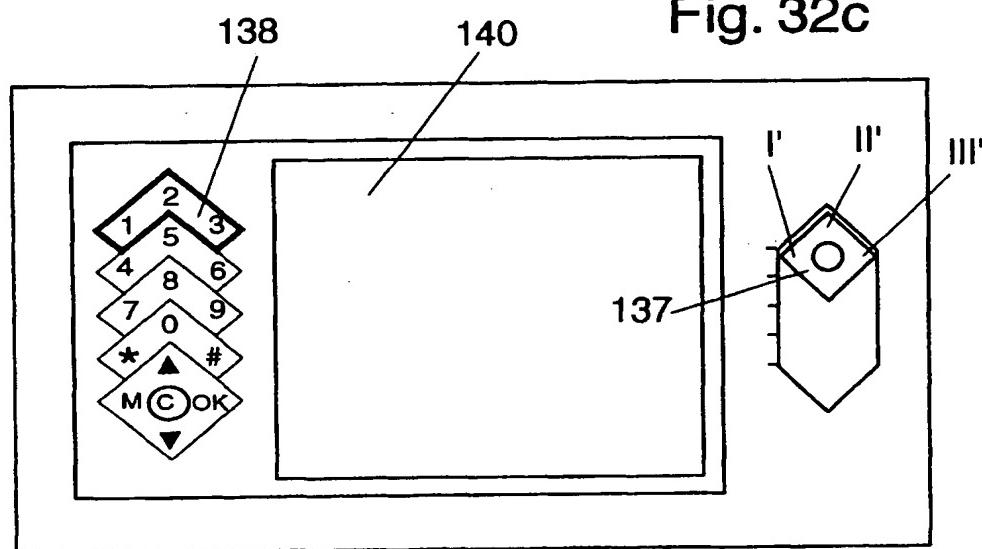


Fig. 32d

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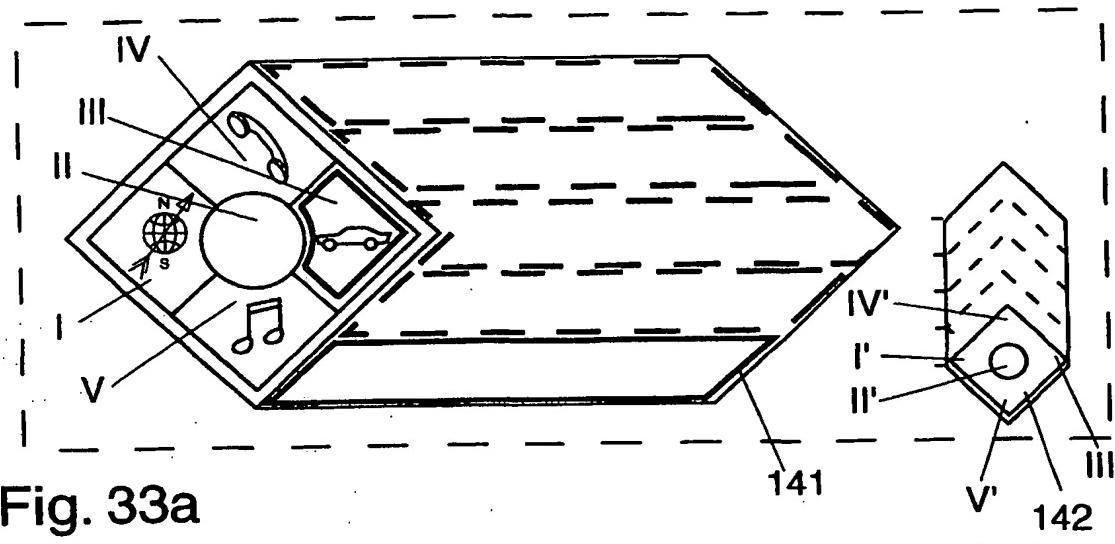


Fig. 33a

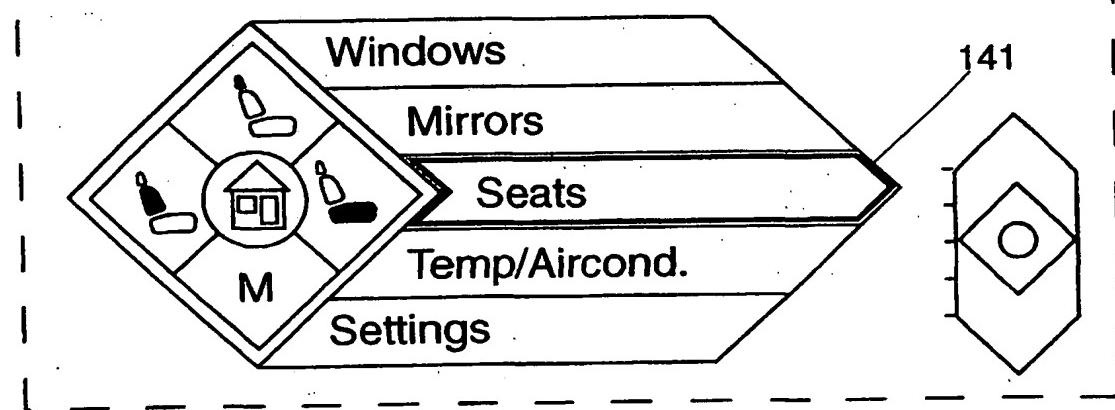


Fig. 33b

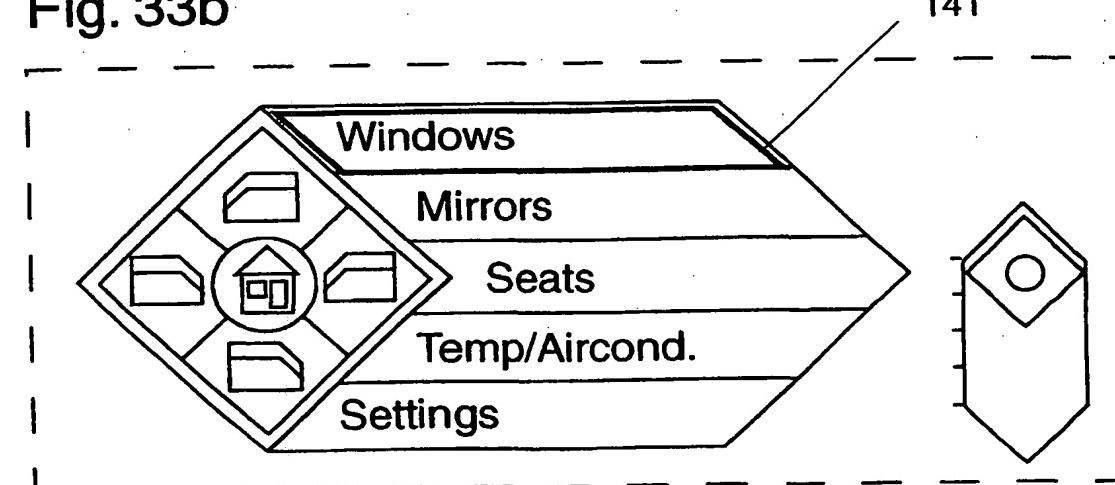


Fig. 33c

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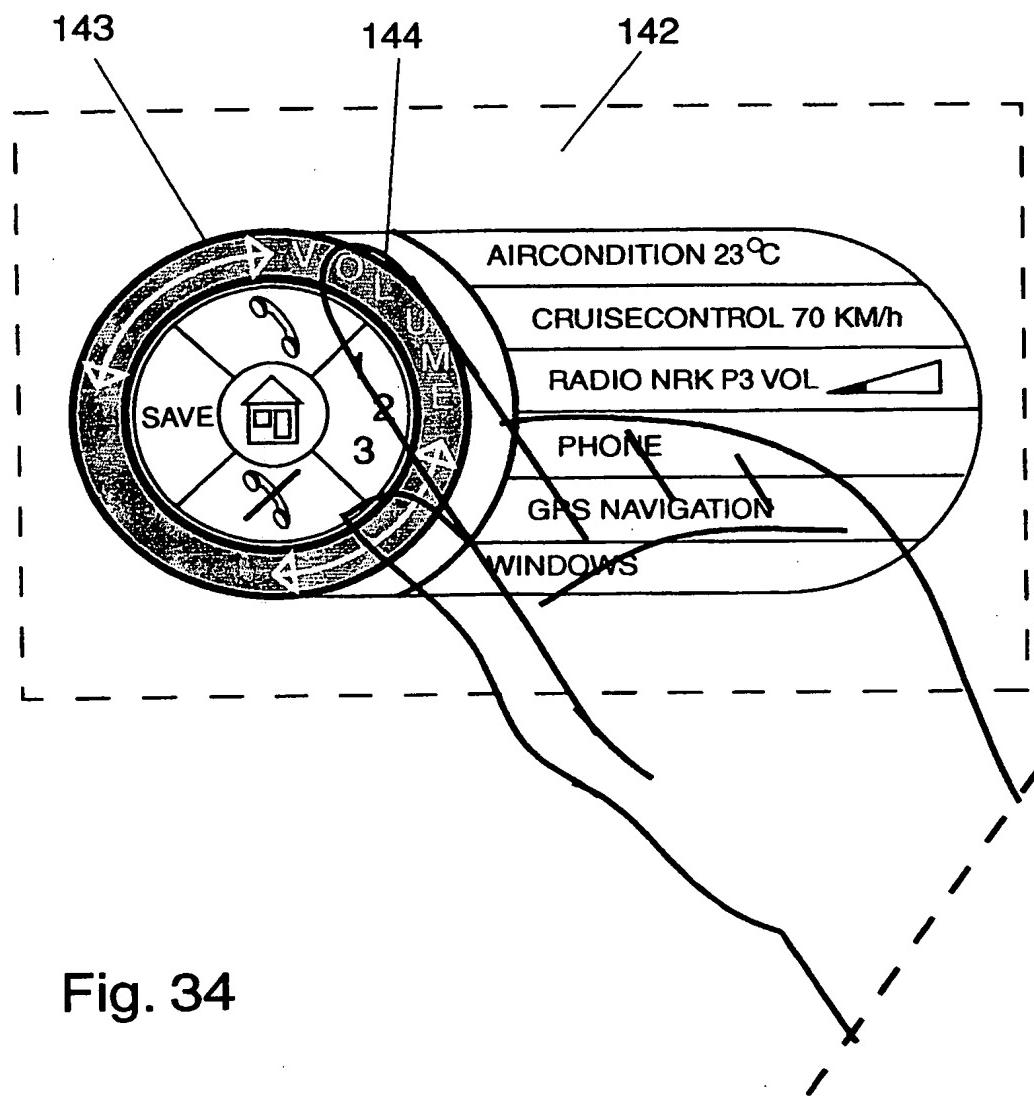


Fig. 34

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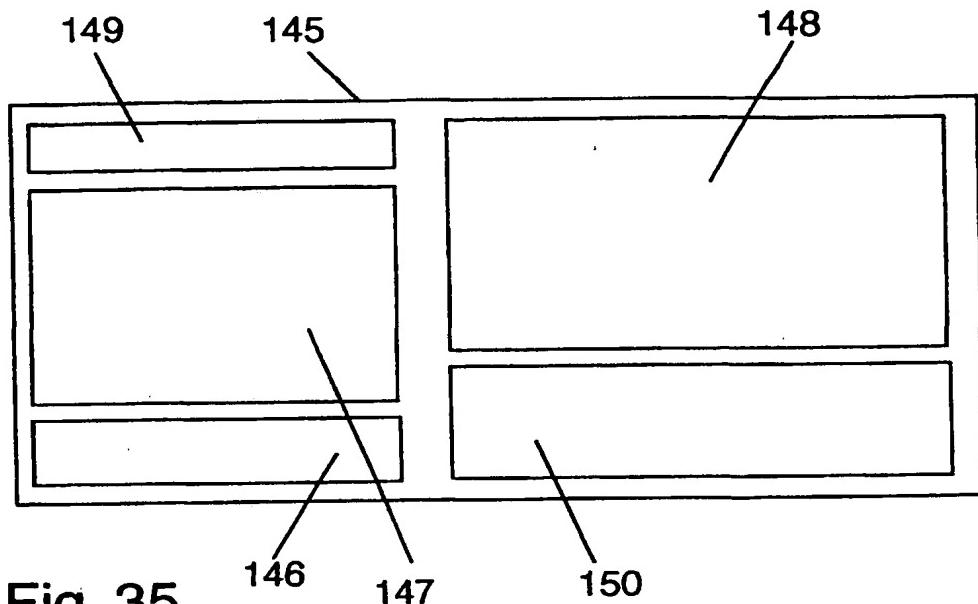


Fig. 35

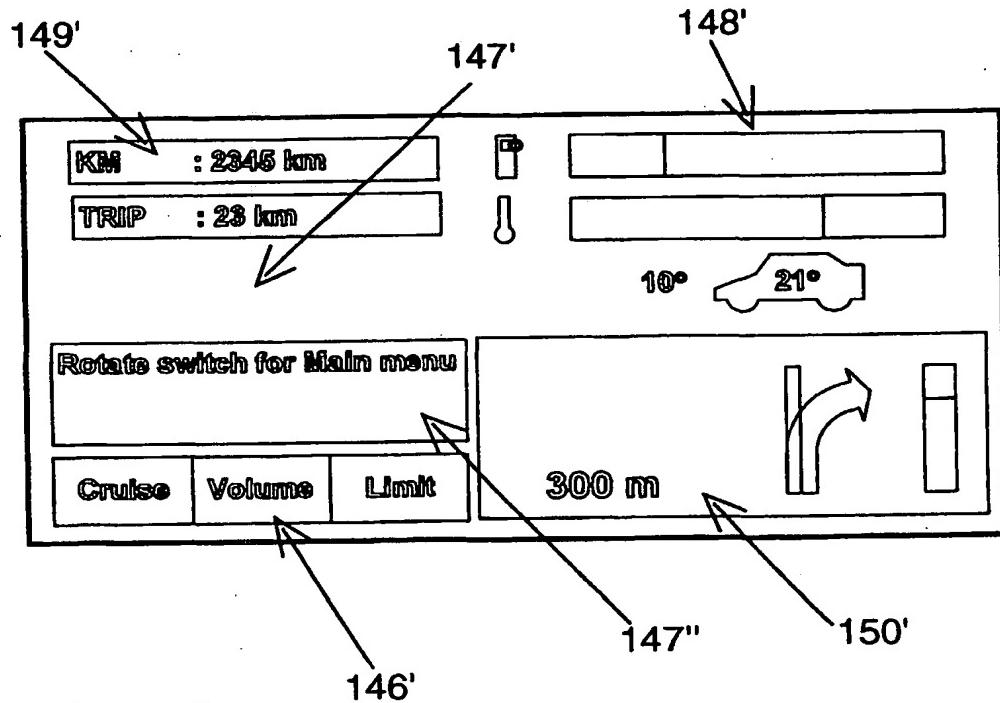


Fig. 36

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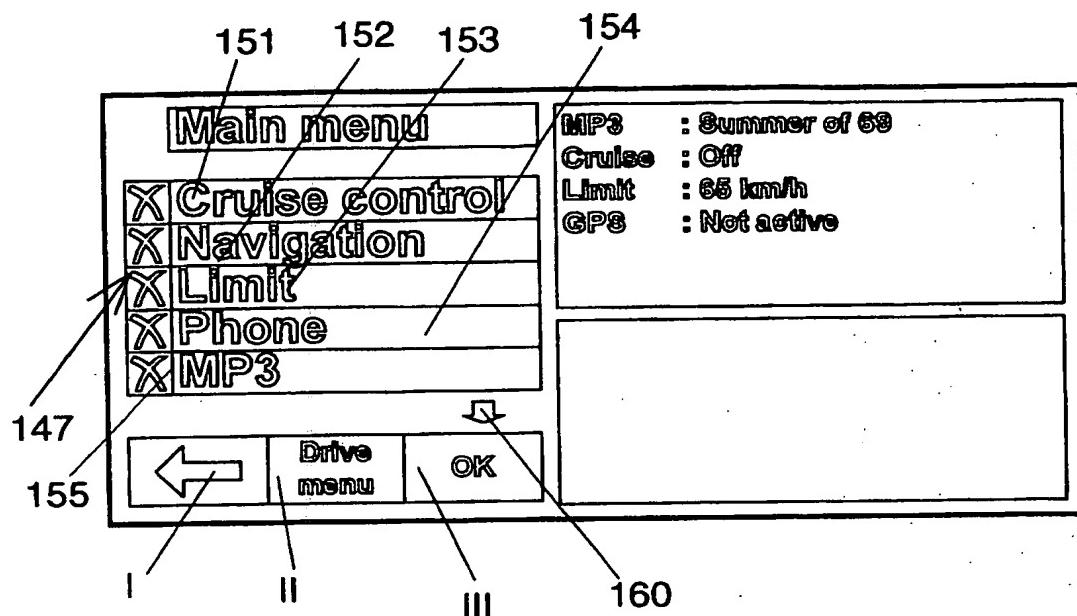


Fig. 37a

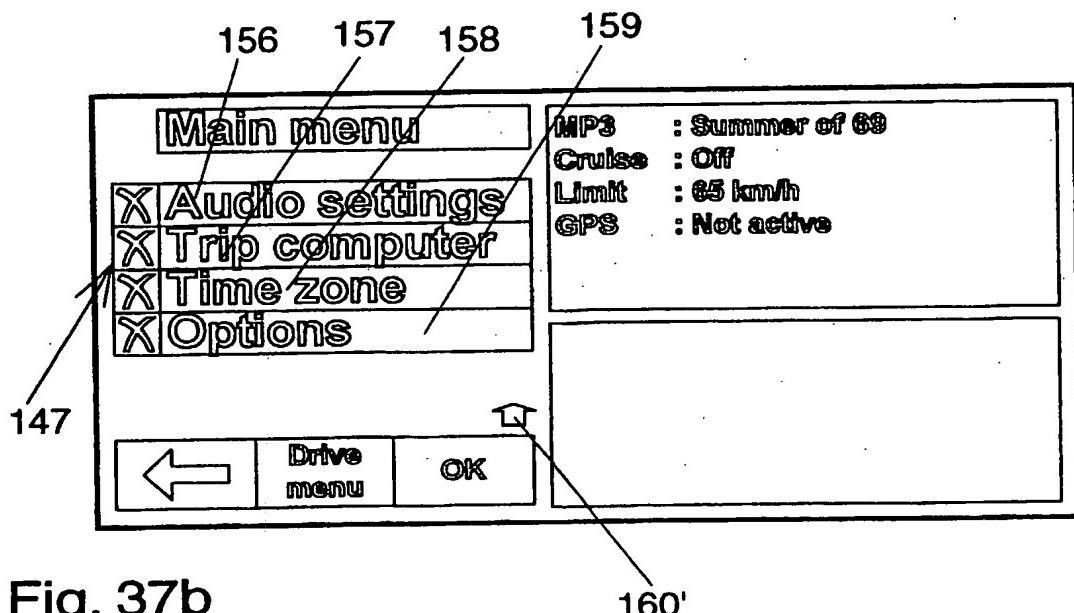


Fig. 37b

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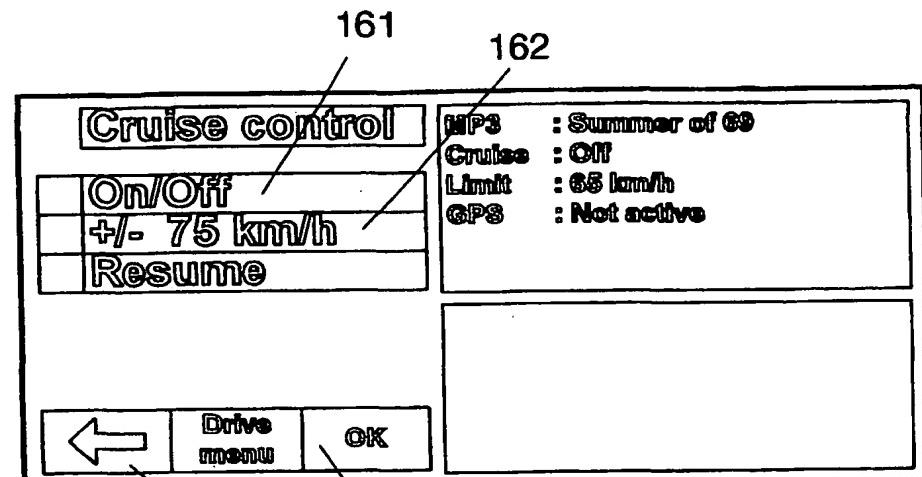


Fig. 38

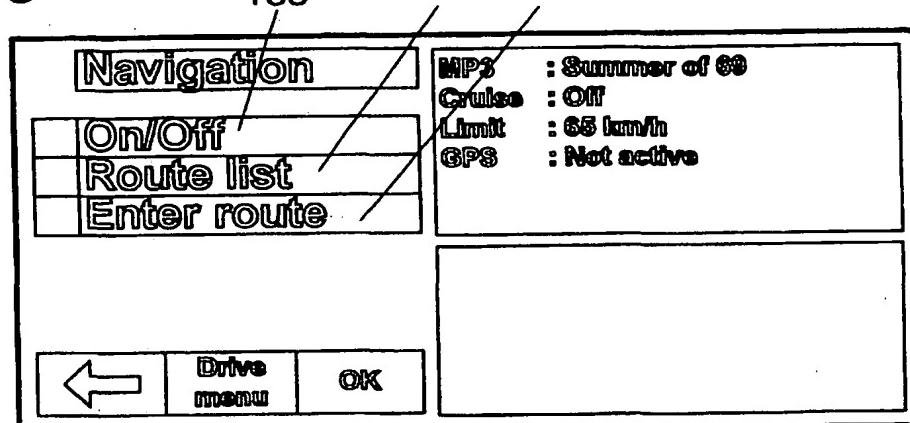


Fig. 39a

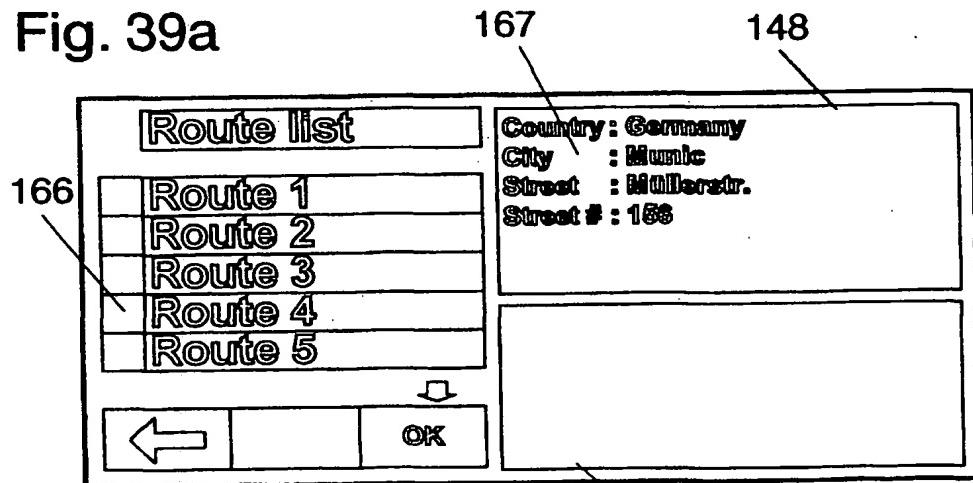


Fig. 39b

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Country: Germany
City : Munile
Street : Müllerstr.
Street #: 158

Fig. 39c

Country: Germany
City : Munile
Street :
Street #: 158
2361 streets left | list

Fig. 39d

Country: Germany
City : Munile
Street :
Street #: 158
2361 streets left | list

Fig. 39e

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Enter Street		
ABC	DEF	GHI
BEF	ILN	RSU
STU	VWX	YZ
Clear		List
<input type="button" value="←"/>		OK
<input type="button" value="BEF"/> <input type="button" value="ILN"/> <input type="button" value="RSU"/>		

Country : Germany
 City : Munic
 Street : Müllerstr.
 Street # : 156

162 streets left in list

Fig. 39f

174

Limit		
<input type="checkbox"/> On/Off <input type="checkbox"/> +/- 75 km/h <input type="checkbox"/> Resume		
<input type="button" value="←"/>	Drive menu	OK

MP3 : Summer of 00
 Cruise : Off
 Limit : 65 km/h
 GPS : Not active

Fig. 40

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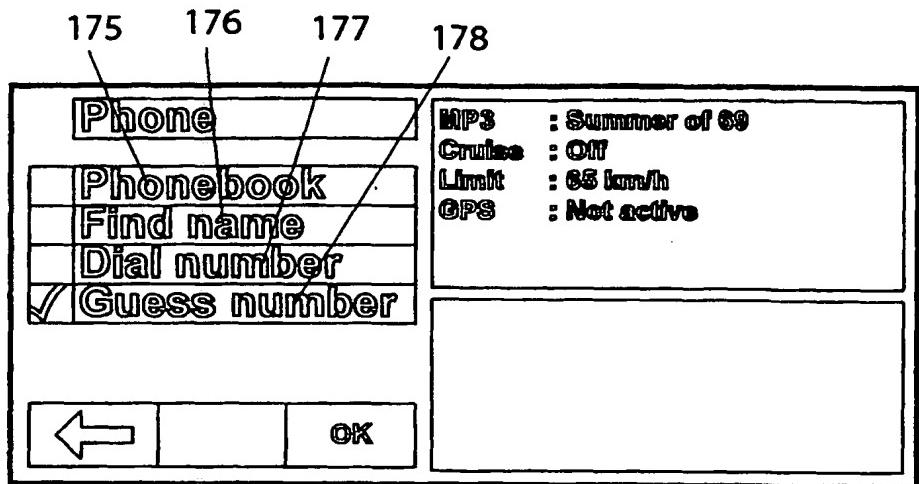


Fig. 41a

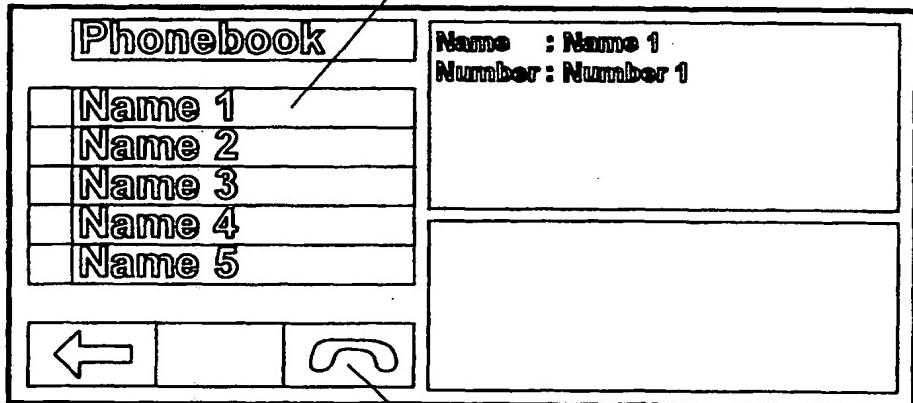


Fig. 41b

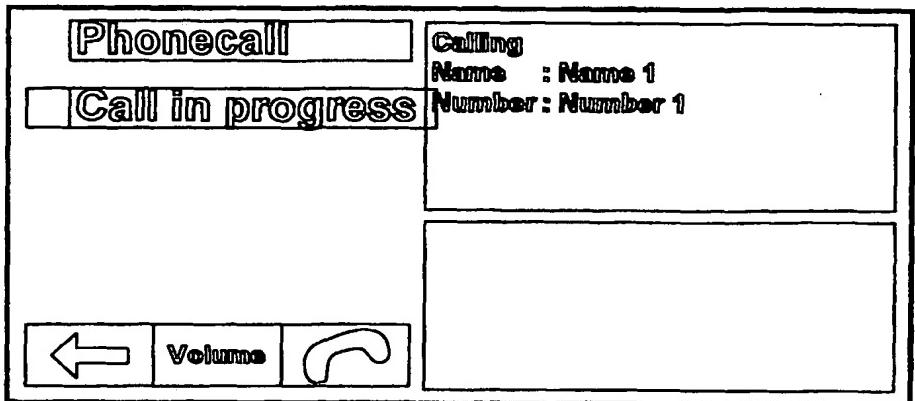


Fig. 41c

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Find name		
ABC	DEF	GHI
JKL	NMO	PQR
STU	VWX	YZ
Clear		List
JKL	MNO	PQR

Name :
Number:
300 names in list

Fig. 41d

Find name		
ABC	DEF	GHI
N	M	O
STU	VWX	YZ
Clear		List
N	M	O

Name :
Number:
300 names in list

Fig. 41e

Find name		
ABC	DEF	GHI
BEF	ILN	RSU
STU	VWX	YZ
Clear		List
BEF	ILN	RSU

Name : Meier-Arendt
Number: 00 73124119
16 names in list

Fig. 41f

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Dial number		
1	2	3
4	5	6
7	8	9
Clear	0	List
<input type="button" value="←"/> <input type="button" value=""/> <input type="button" value="List"/>		
4	5	6

Name : Weller-Arendt
Number: 60 73124119
43 numbers in list

Fig. 41g

MP3	
<input type="button" value="Play/Stop"/> <input type="button" value="Song 2"/> <input type="button" value="Song 3"/> <input type="button" value="Song 4"/> <input type="button" value="Song 5"/>	
<input type="button" value="←"/> <input type="button" value="Volume"/> <input type="button" value="OK"/>	
<input type="button" value="MP3 : Summer of 99"/> <input type="button" value="Cruise : Off"/> <input type="button" value="Limit : 65 km/h"/> <input type="button" value="GPS : Not active"/>	

Fig. 42

Audio settings	
<input type="button" value="Bass +/- -3"/> <input type="button" value="Treble +/- +1"/> <input type="button" value="Fader +/- 0"/> <input type="button" value="Balance +/- -2"/>	
<input type="button" value="←"/> <input type="button" value="Volume"/> <input type="button" value="Adjust"/>	
<input type="button" value="MP3 : Summer of 99"/> <input type="button" value="Cruise : Off"/> <input type="button" value="Limit : 65 km/h"/> <input type="button" value="GPS : Not active"/>	

Fig. 43

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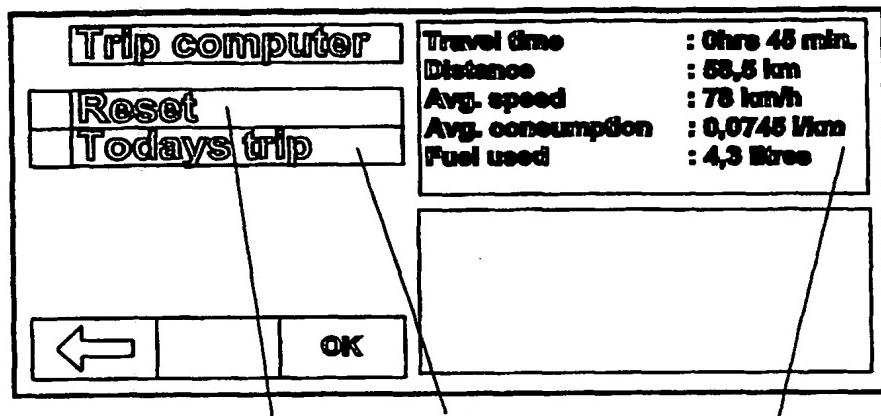


Fig. 44

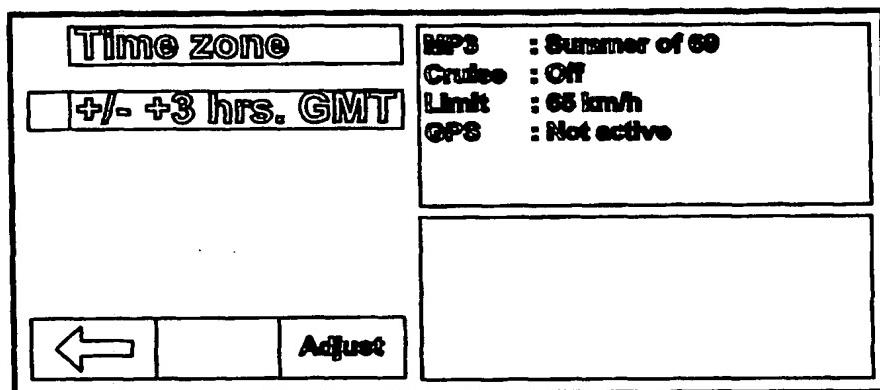


Fig. 45

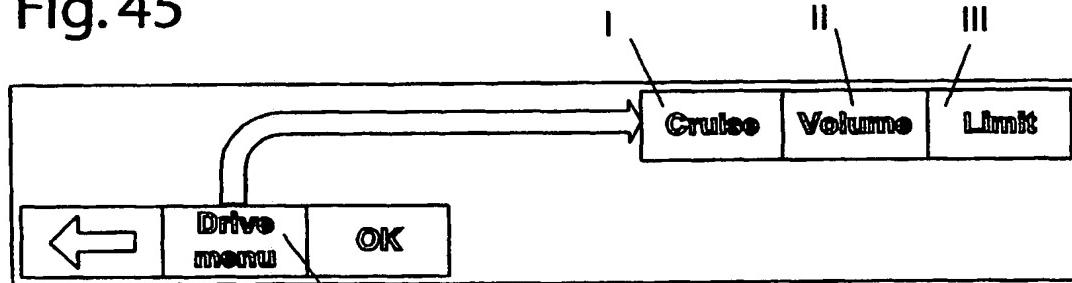


Fig. 46a

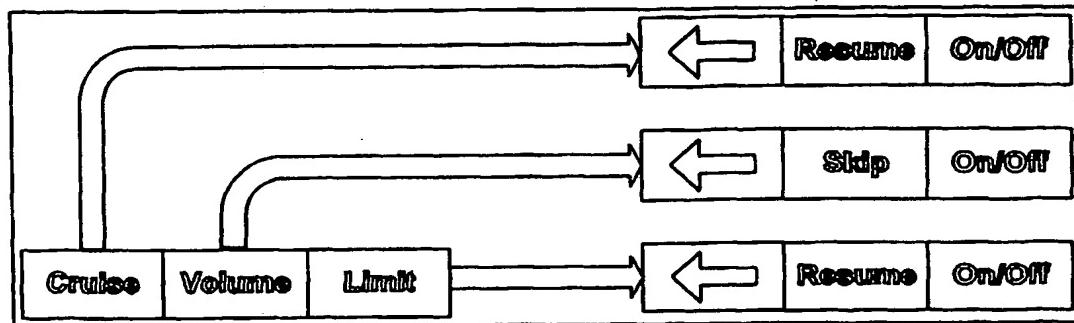


Fig. 46b

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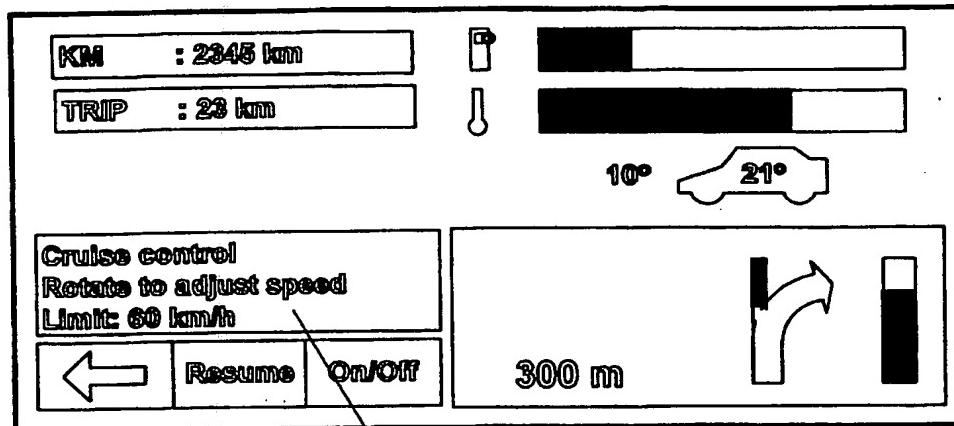


Fig. 47a 184

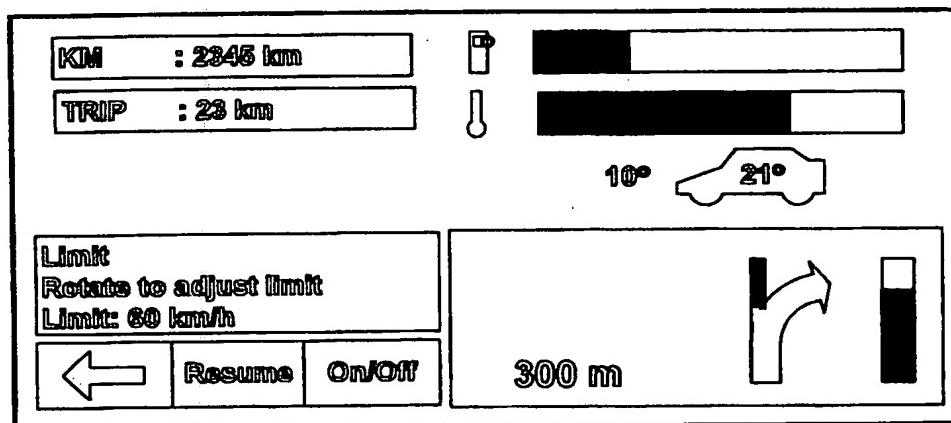


Fig. 47b

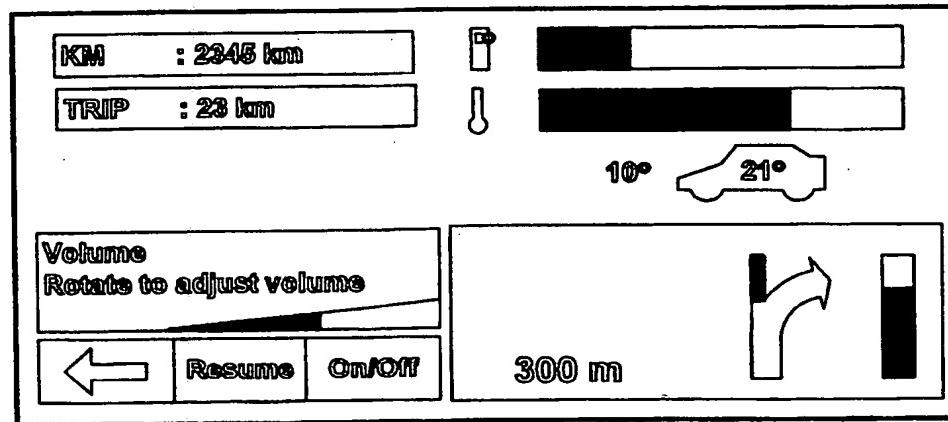


Fig. 47c

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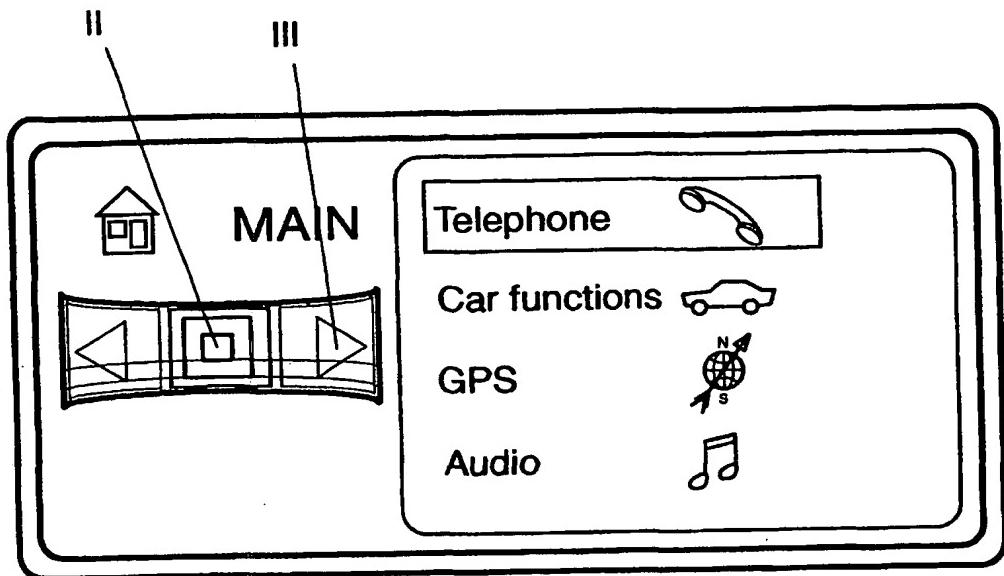


Fig. 48a

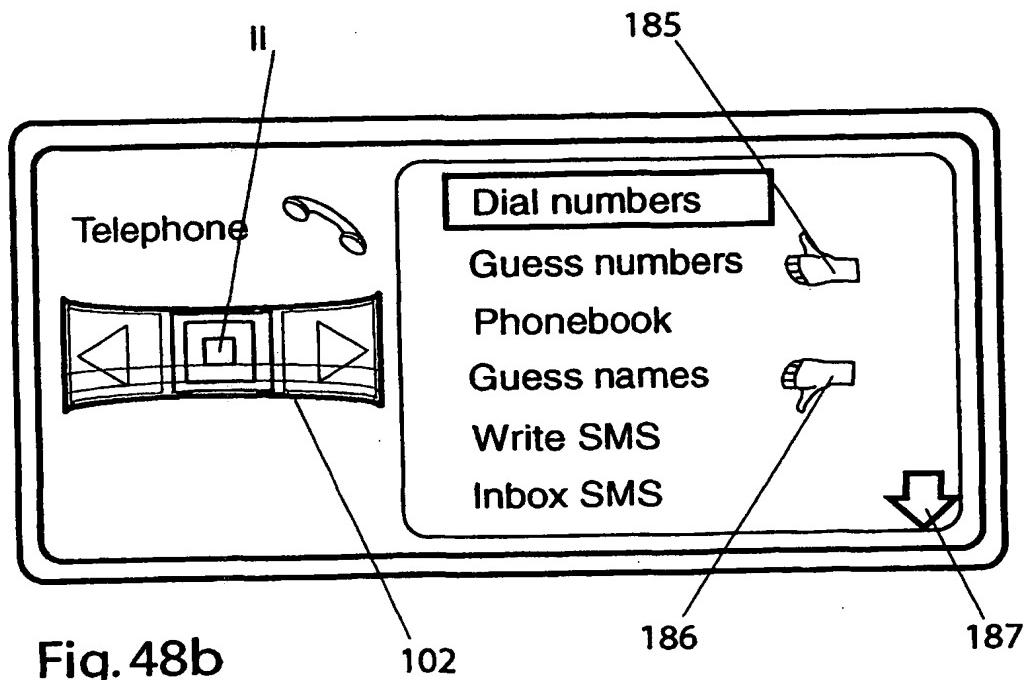
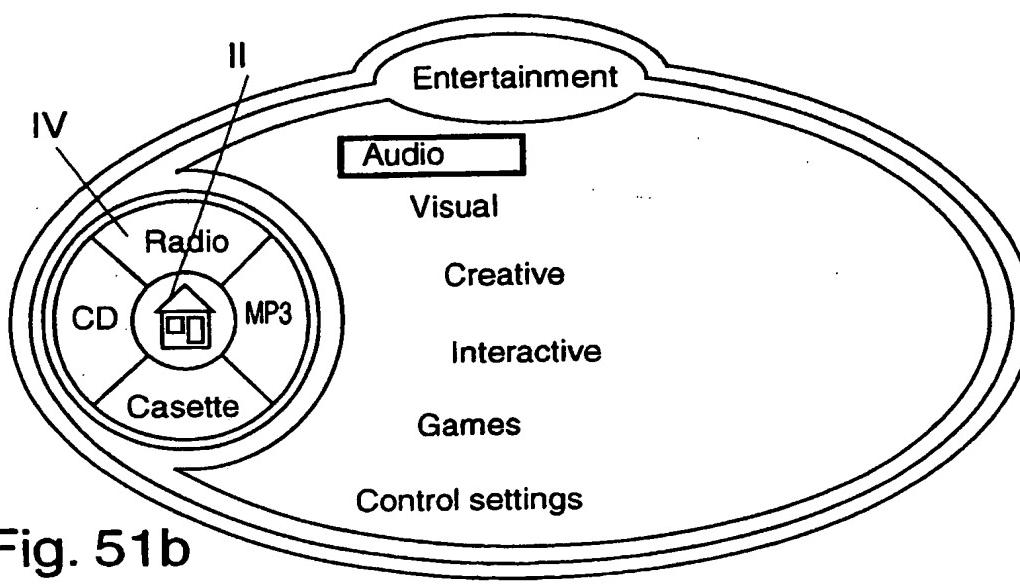
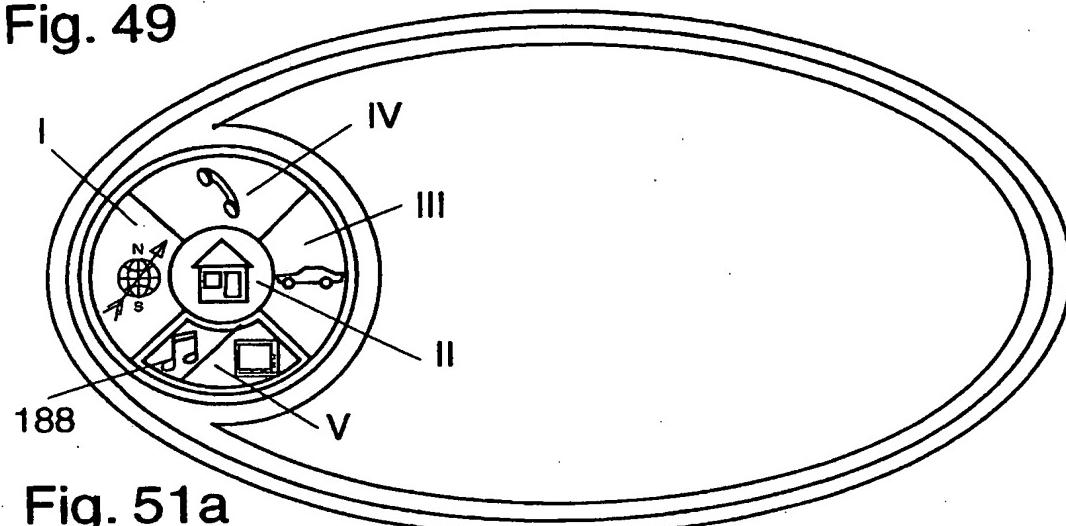
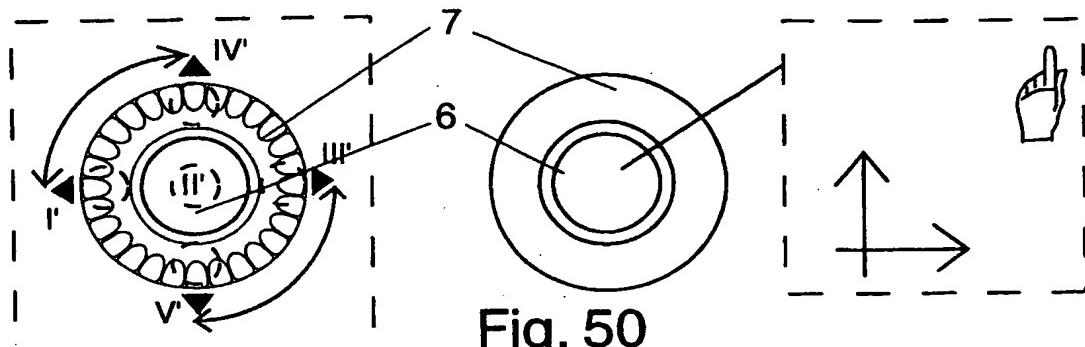


Fig. 48b

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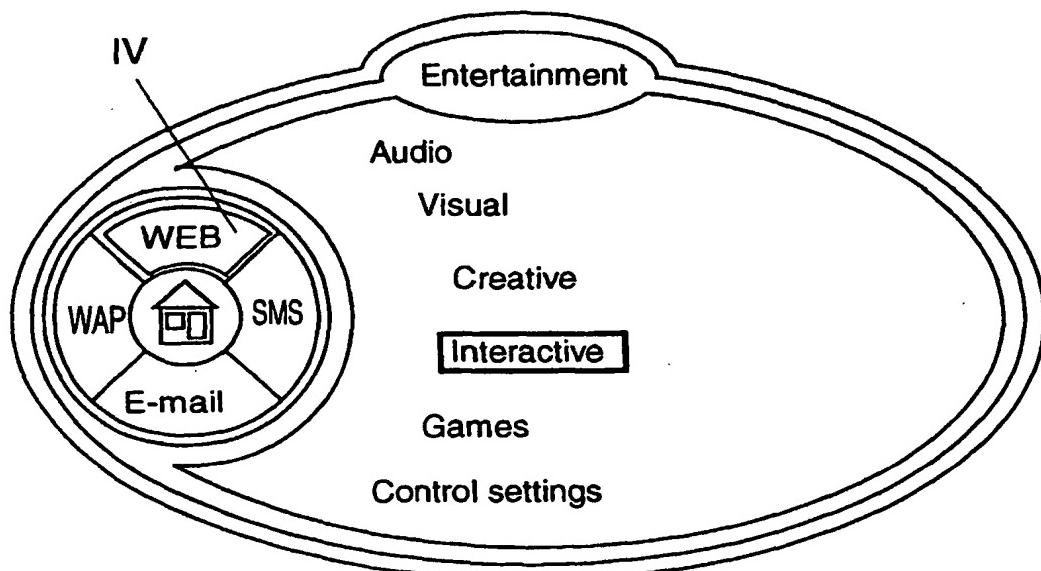


Fig. 51c

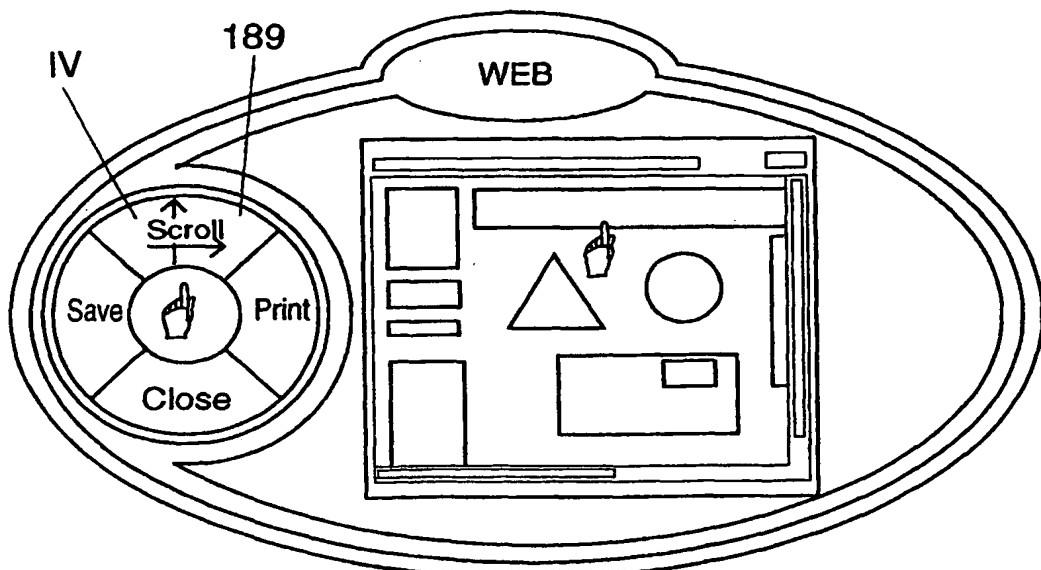


Fig. 51d

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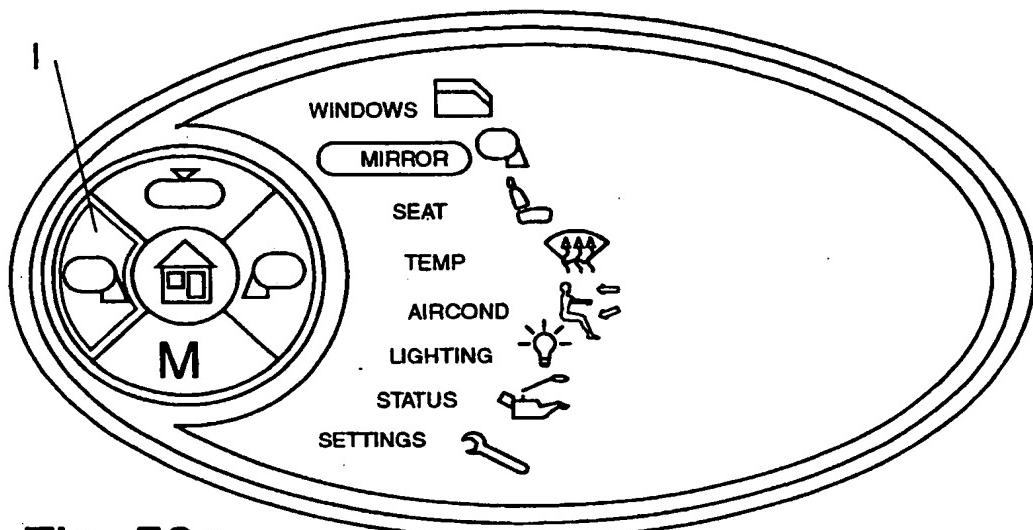


Fig. 52a

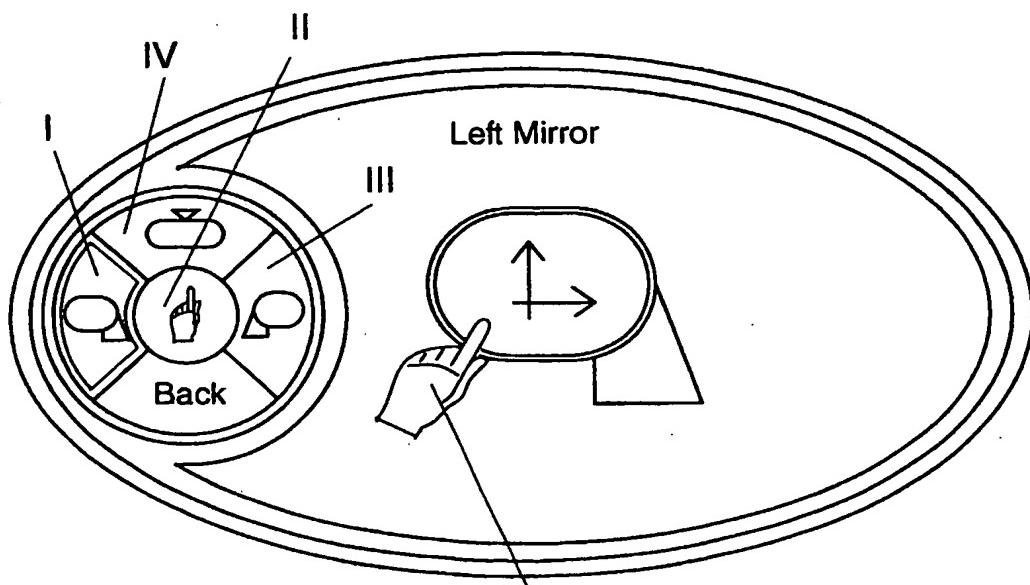


Fig. 52b

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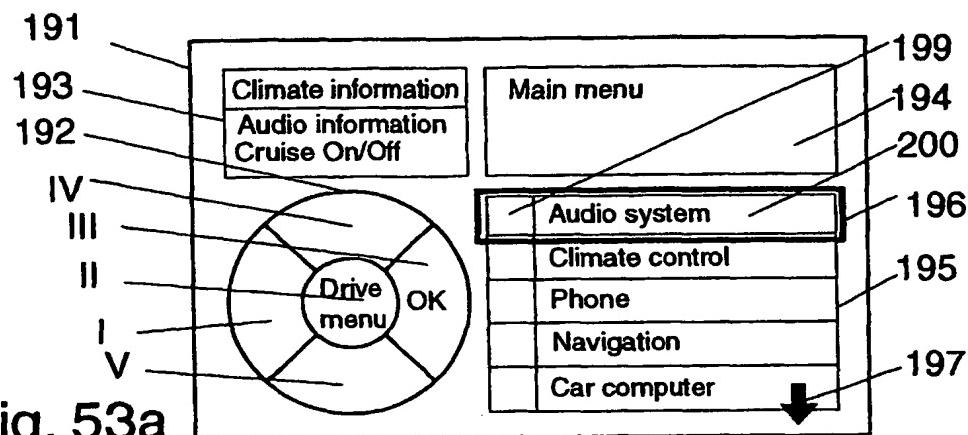


Fig. 53a

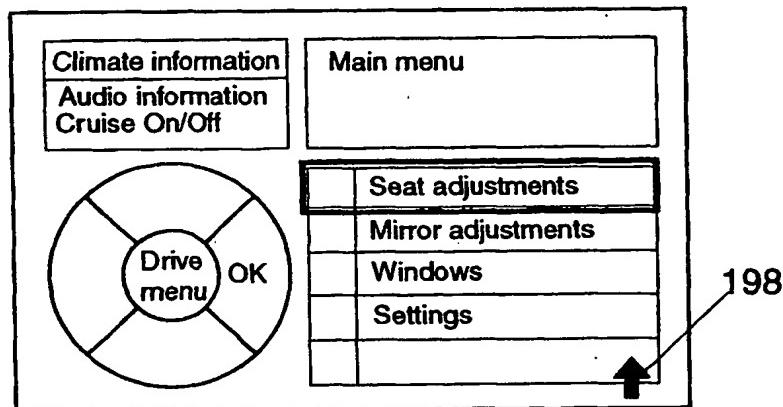


Fig. 53b

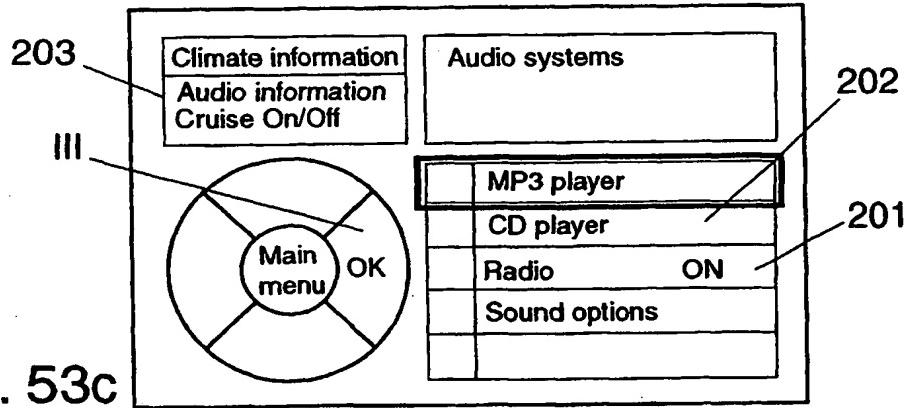


Fig. 53c

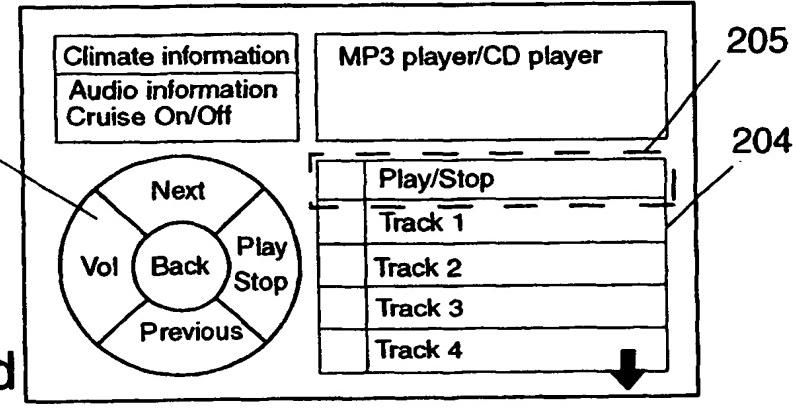
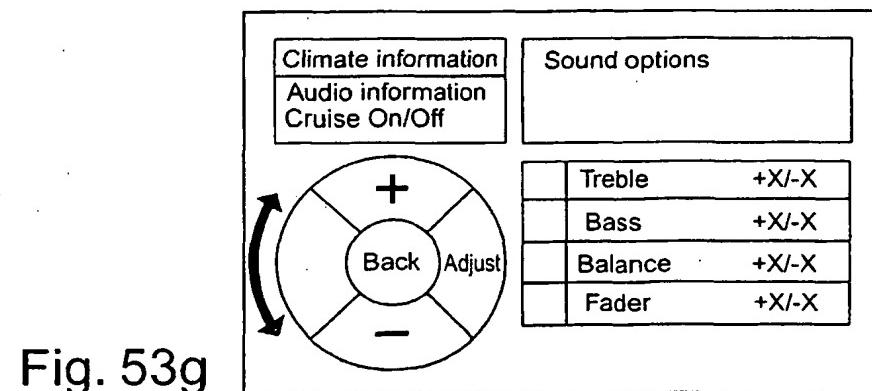
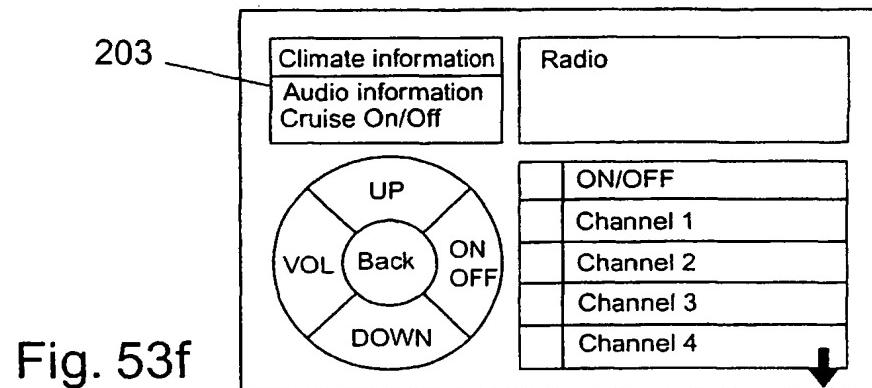
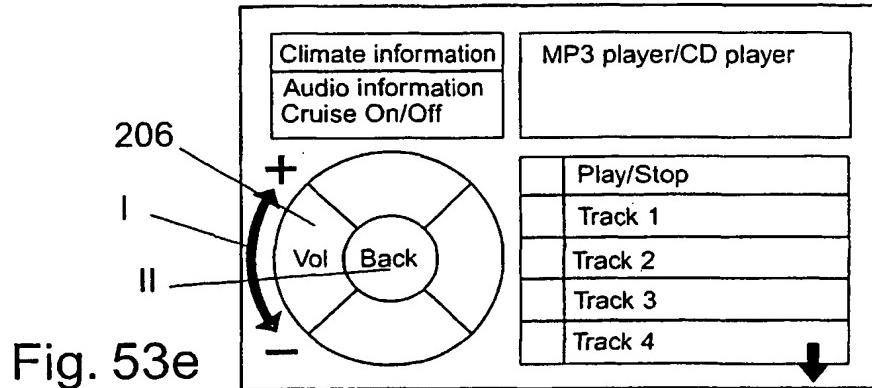


Fig. 53d

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Fig. 53h

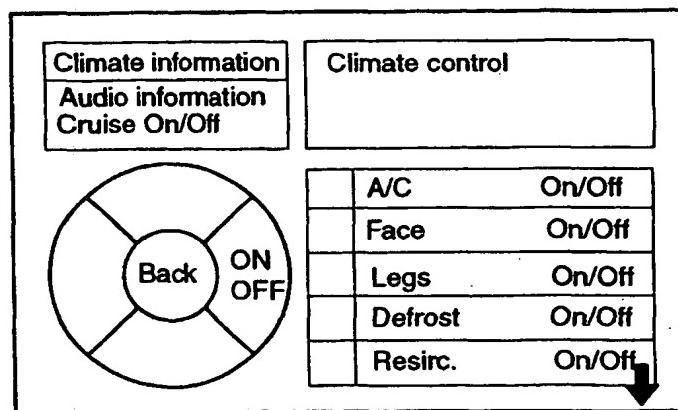


Fig. 53i

III

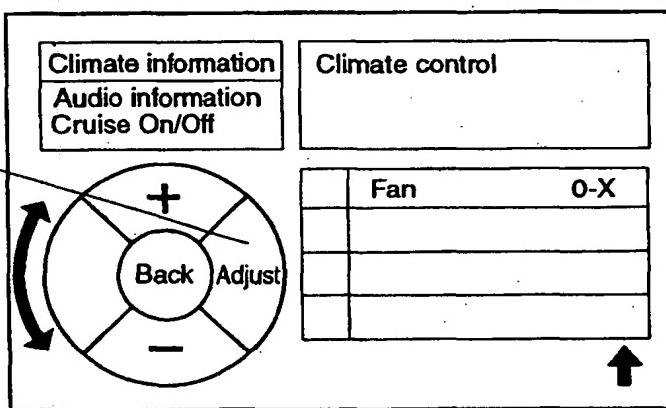


Fig. 53j

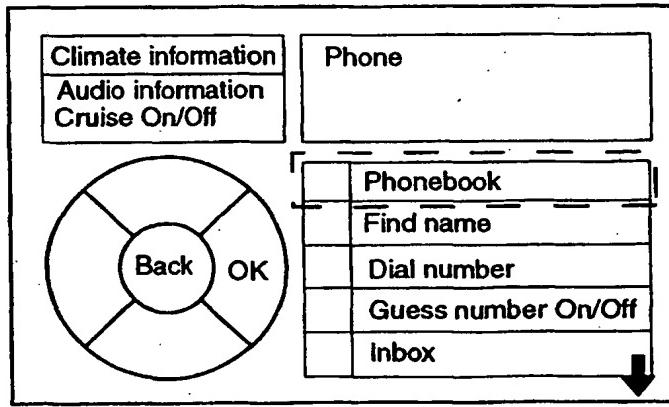
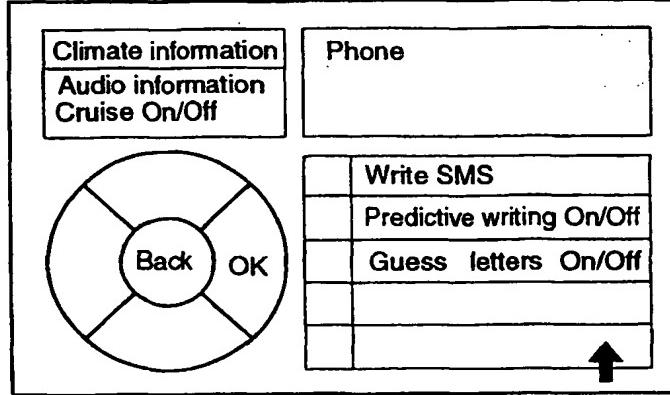
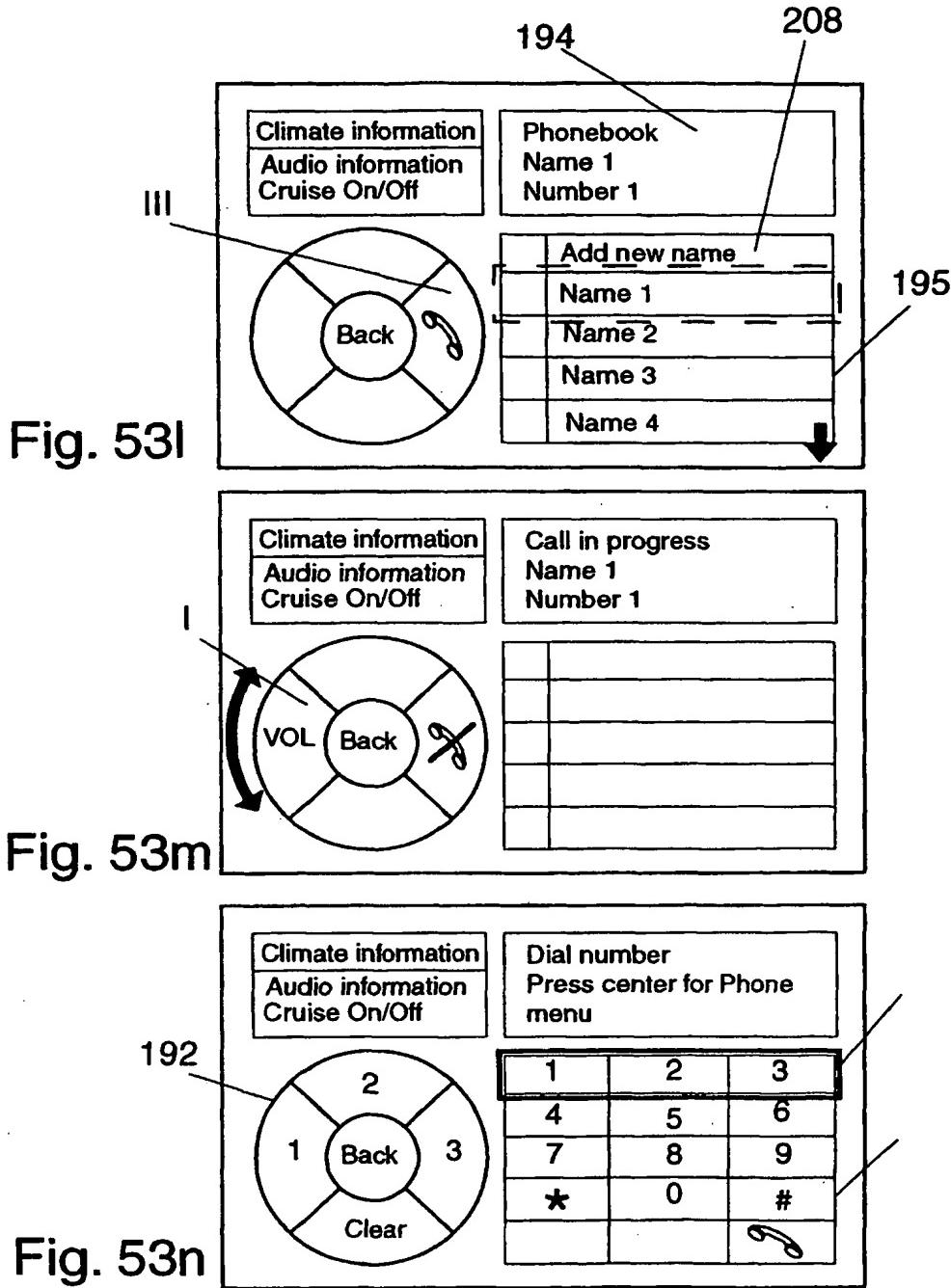


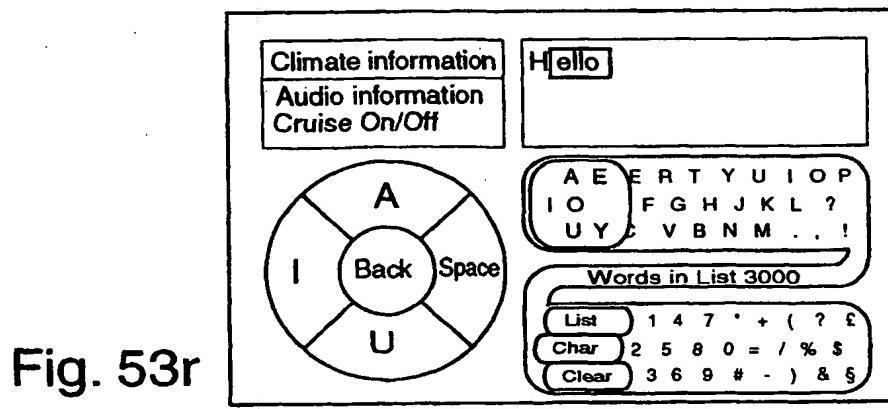
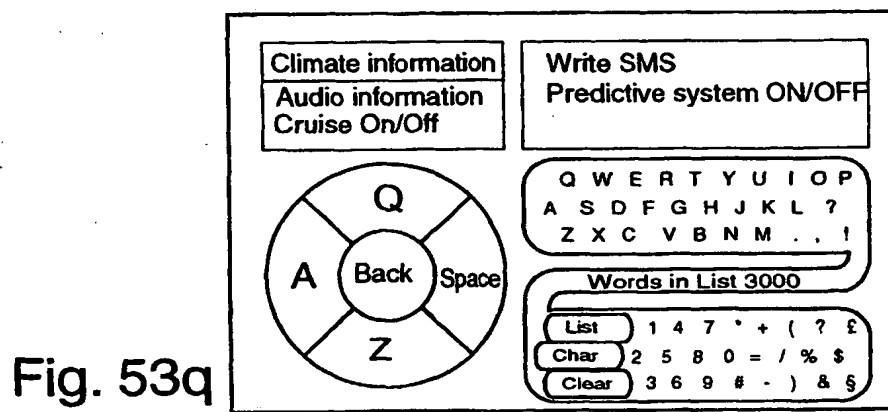
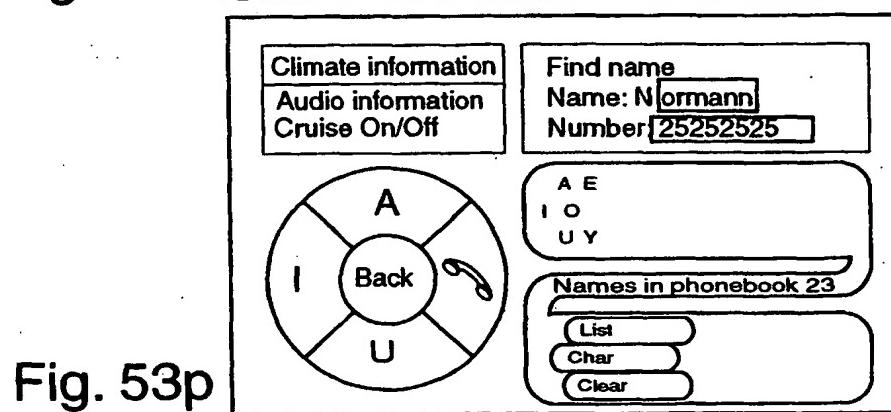
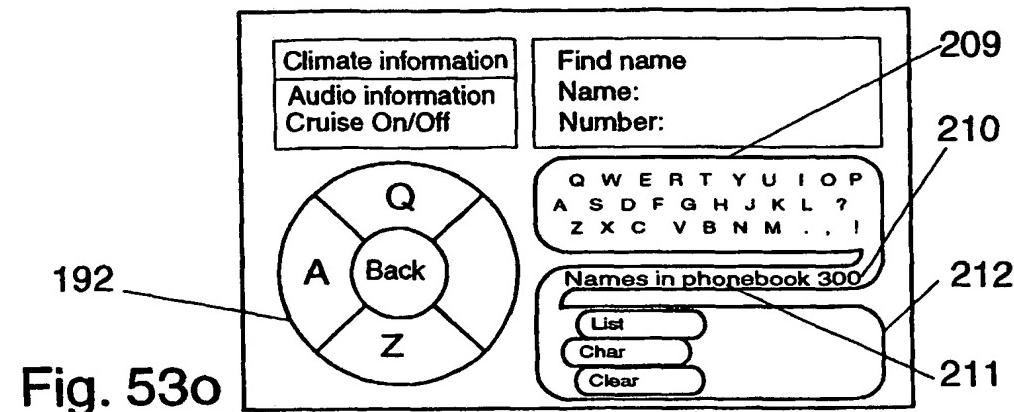
Fig. 53k



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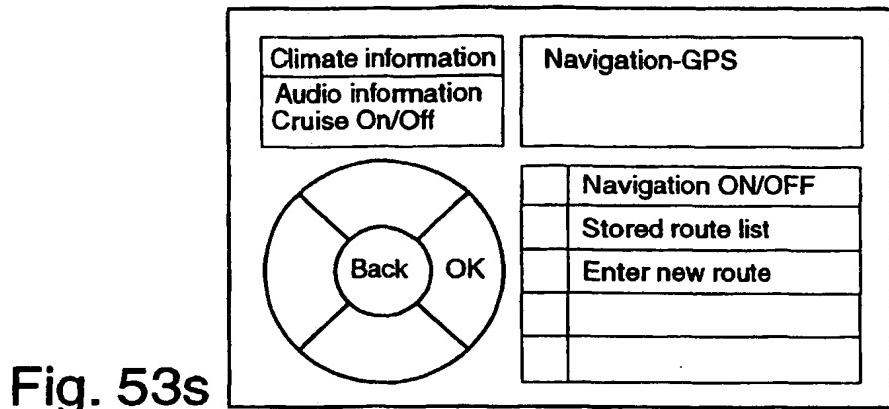


Fig. 53s

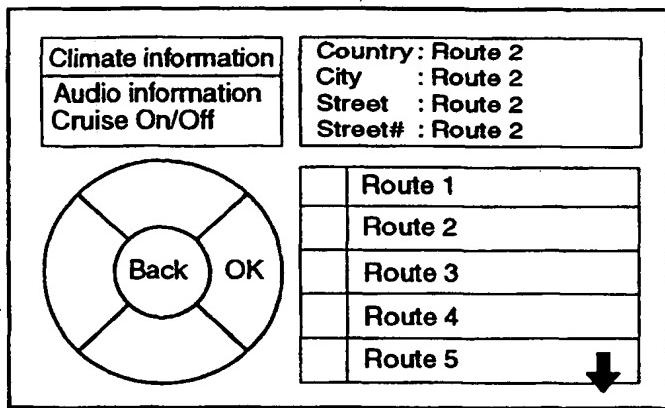


Fig. 53t

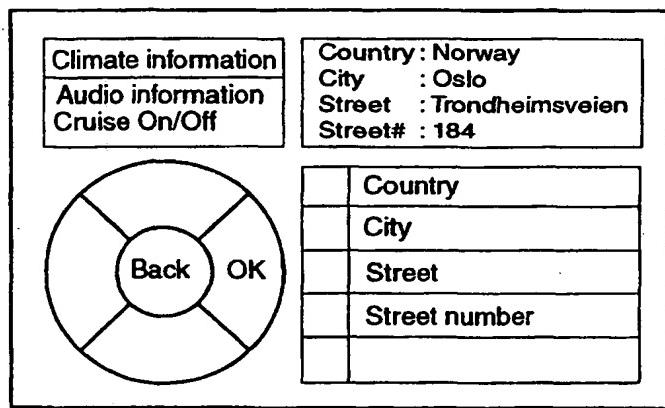


Fig. 53u

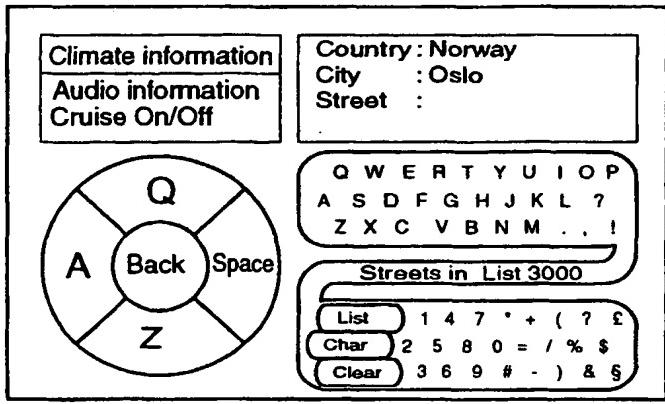


Fig. 53v

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Fig. 53w

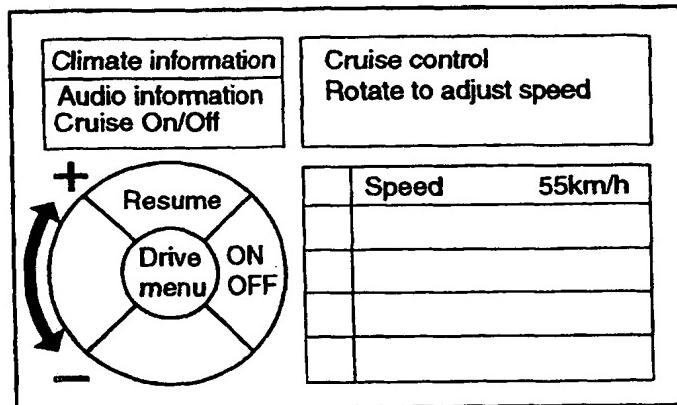


Fig. 53x

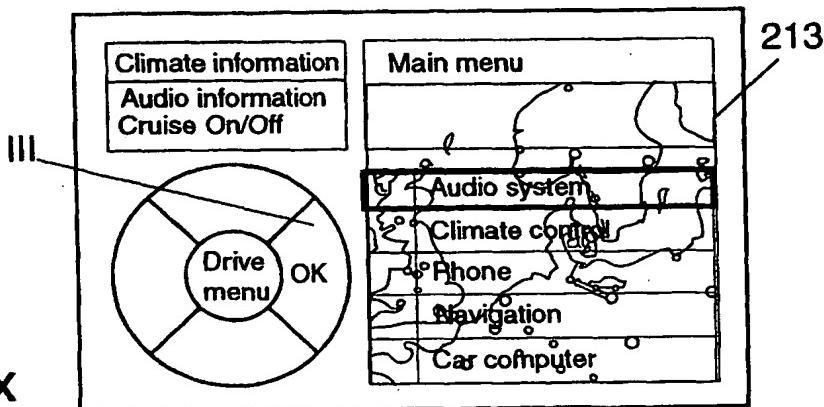
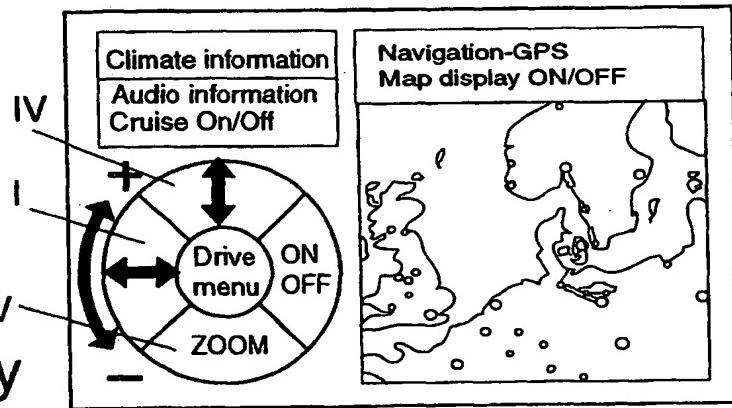


Fig. 53y



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Fig. 53z

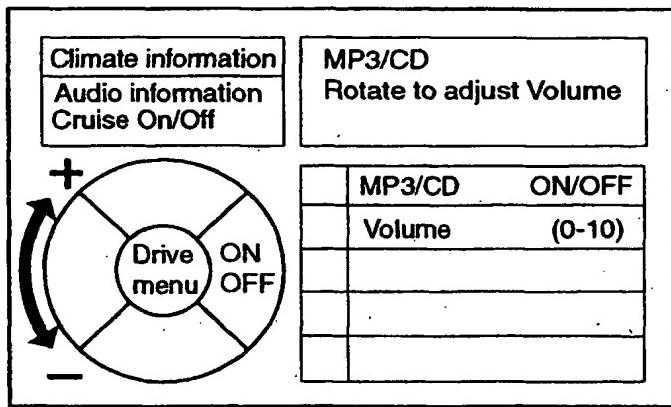
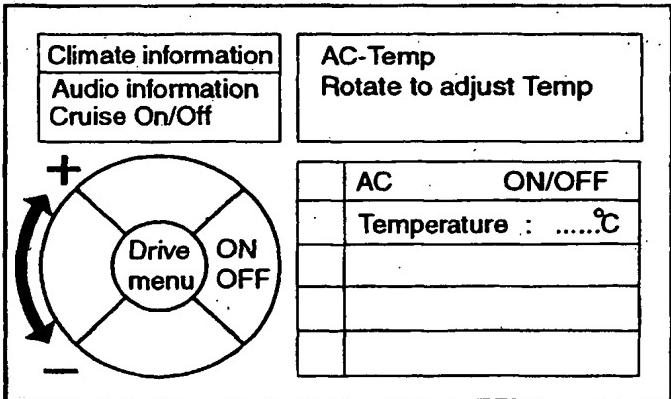
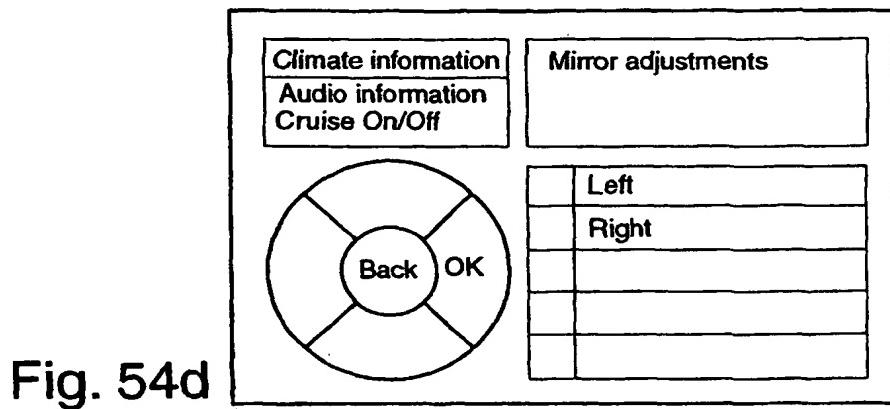
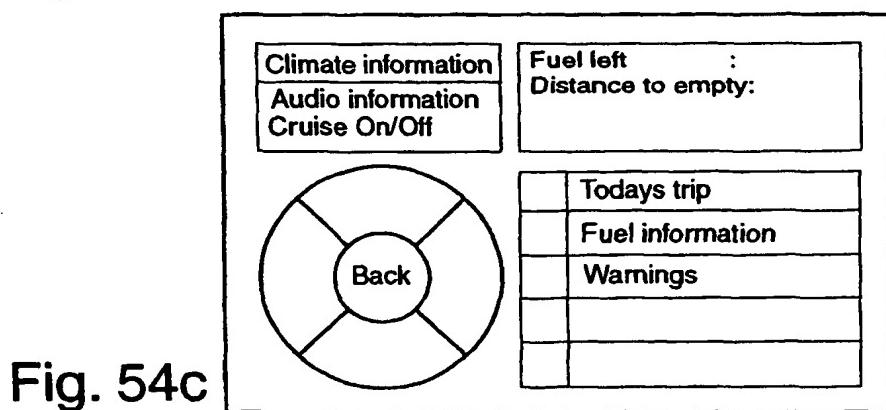
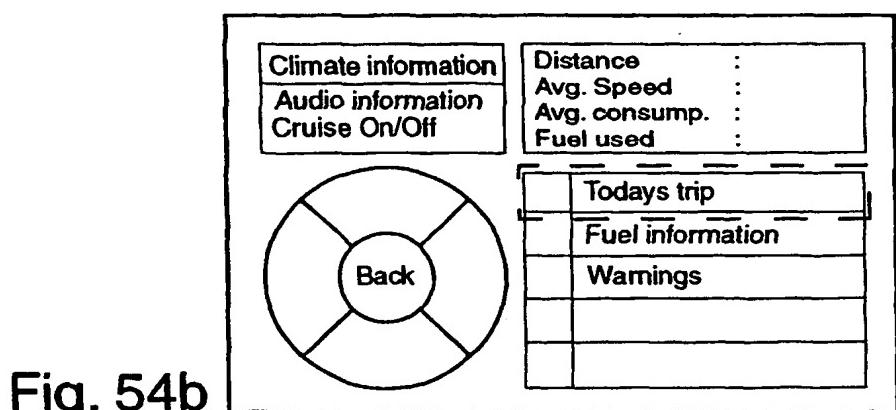
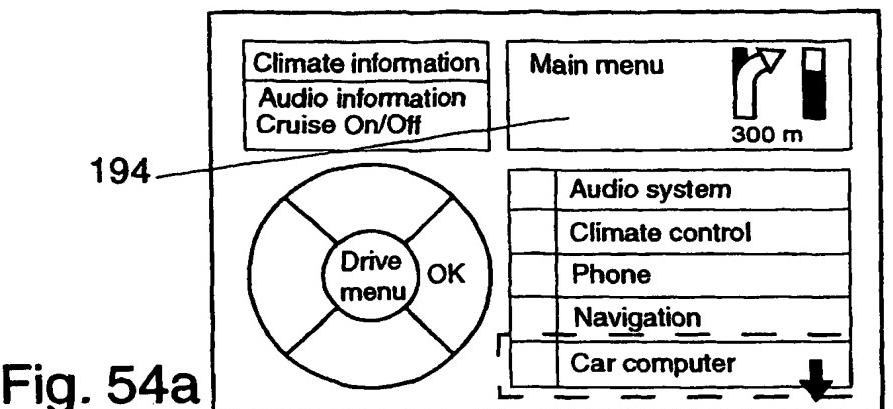


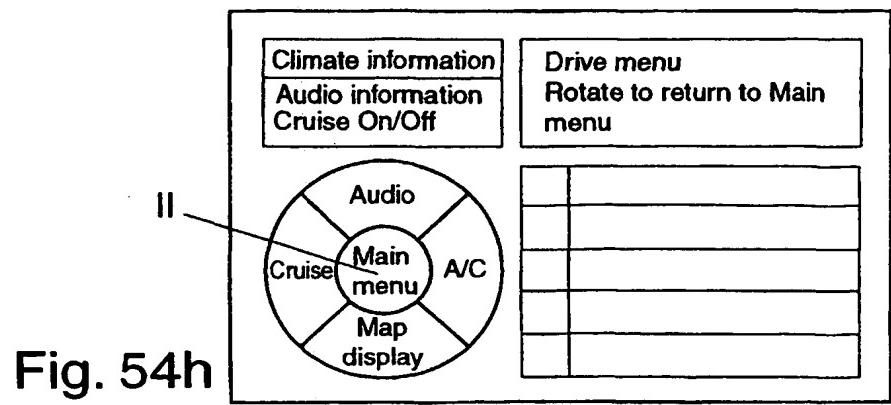
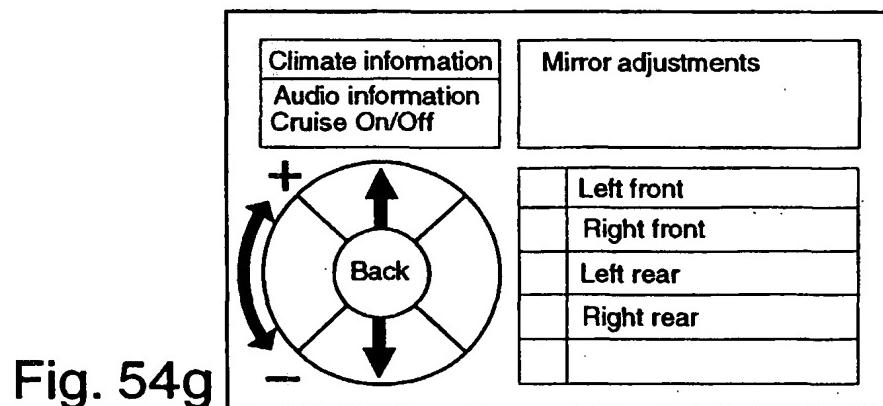
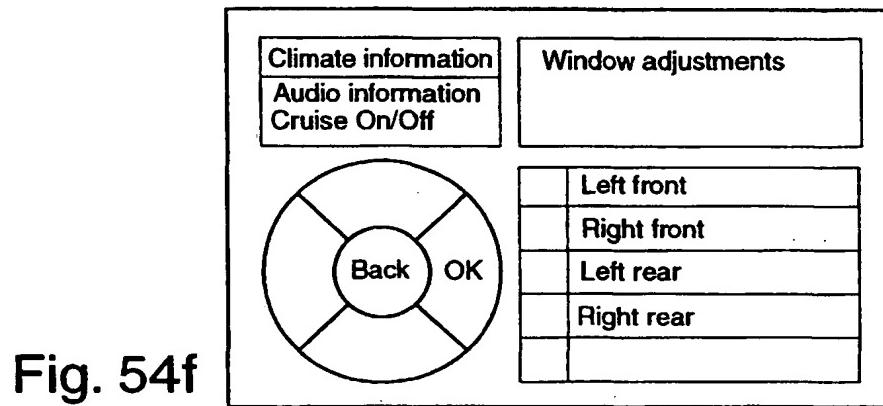
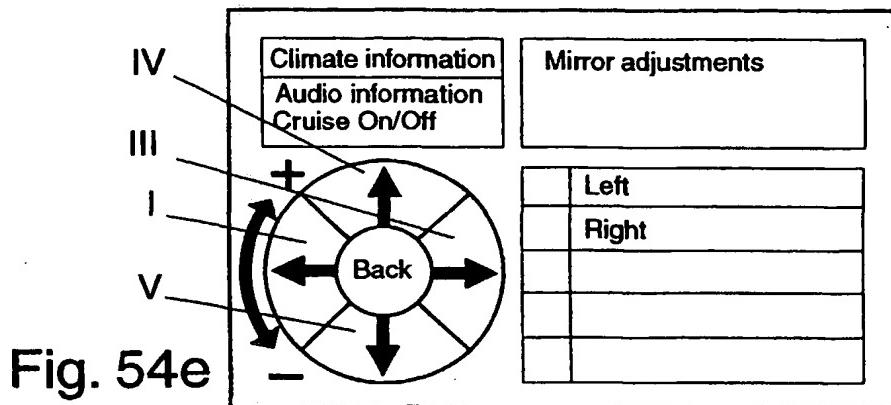
Fig. 53xx



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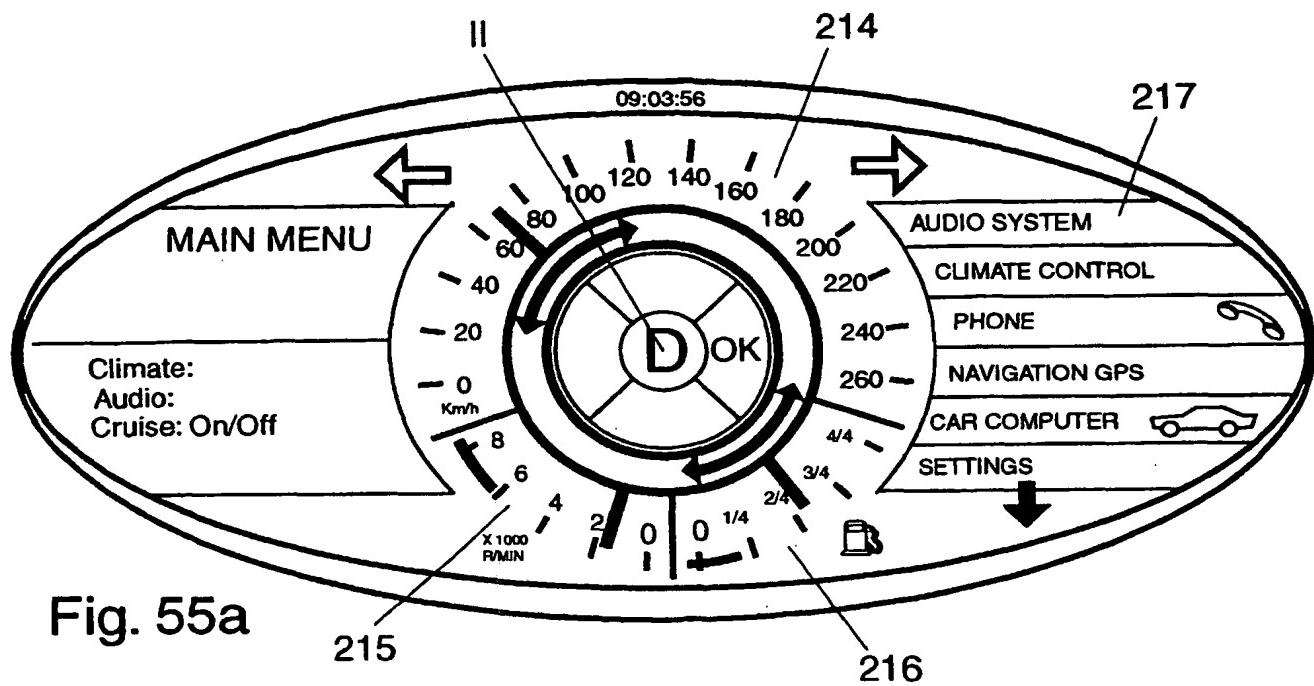


Fig. 55a

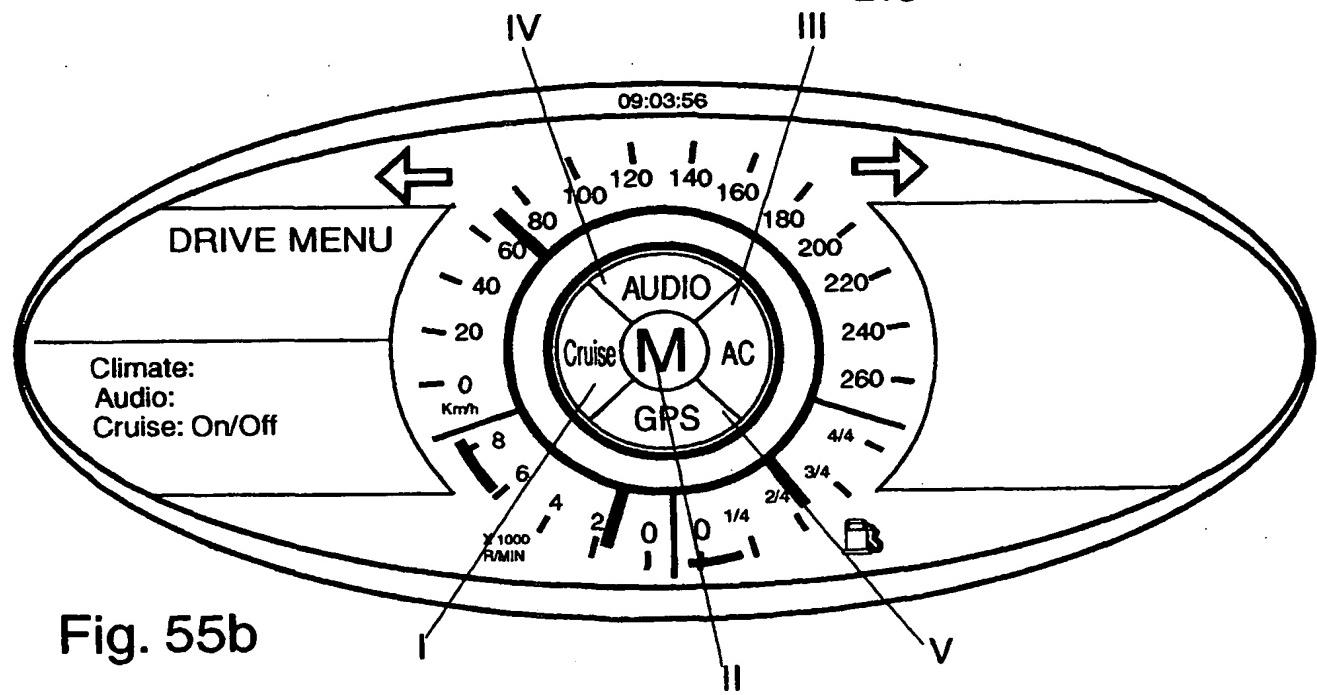


Fig. 55b

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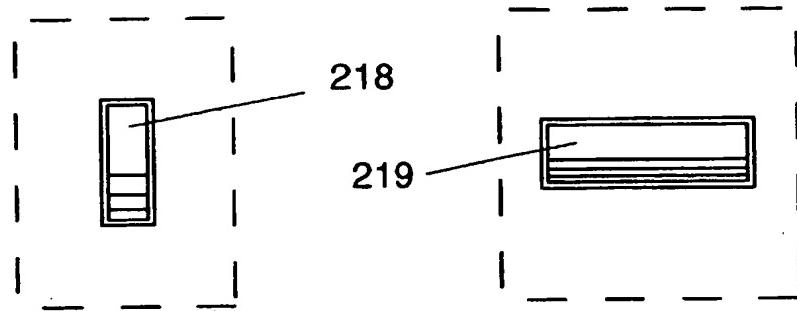


Fig. 56

Fig. 57

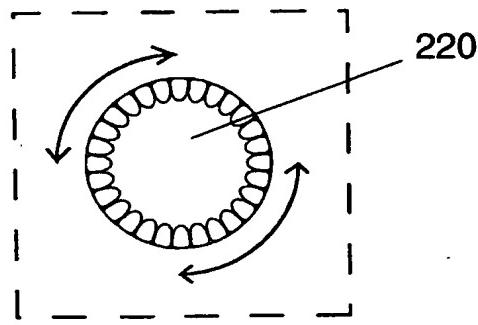


Fig. 58

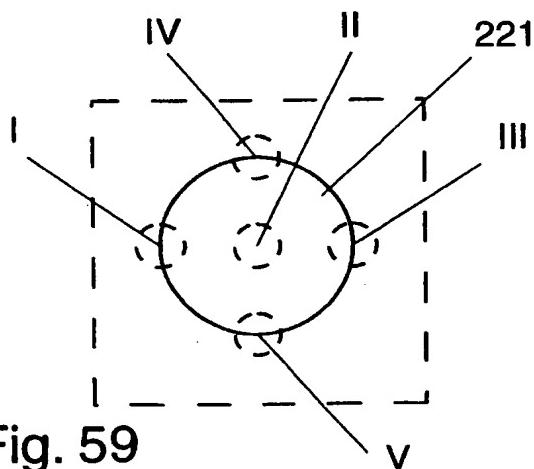


Fig. 59

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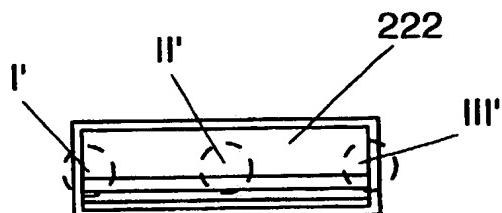


Fig. 60

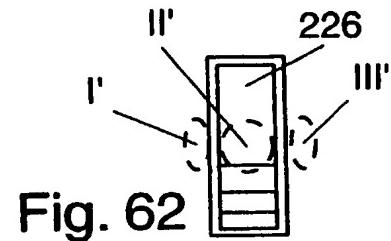


Fig. 62

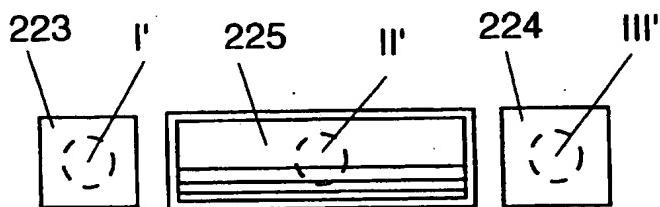


Fig. 61

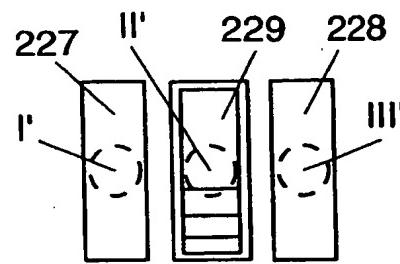


Fig. 63

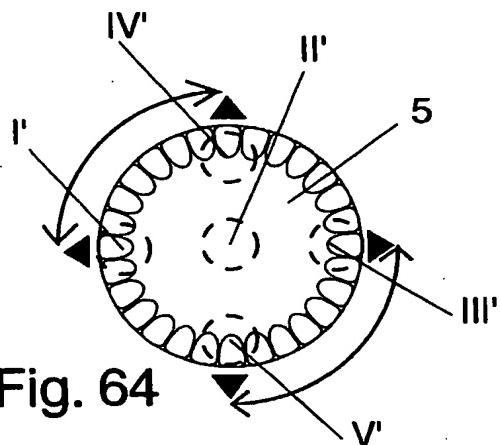


Fig. 64

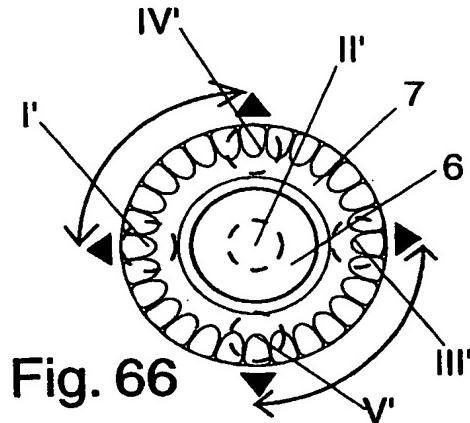


Fig. 66

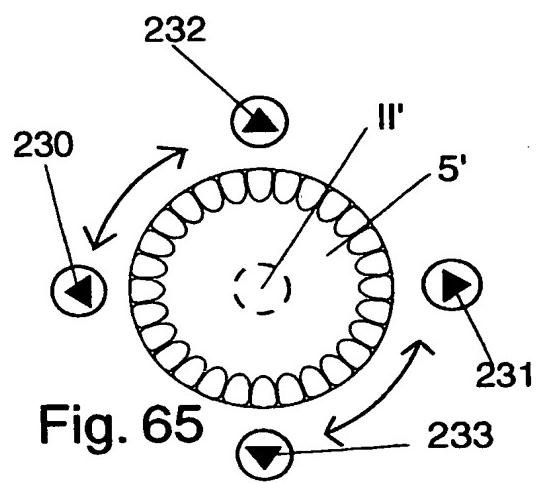


Fig. 65

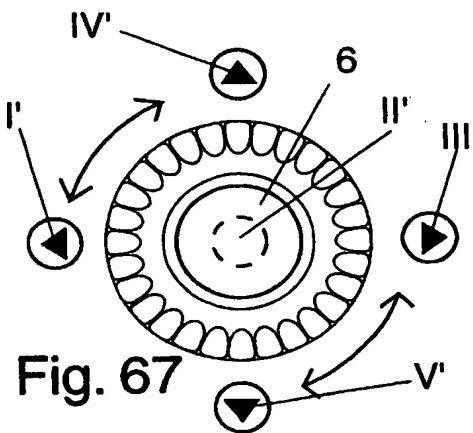


Fig. 67

INTERNATIONAL SEARCH REPORT

International application No.

PCT/NO 02/00351

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: G06F 3/033

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: G06F, G06K, B60R

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL, WPI DATA, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 9809847 A1 (UNITED TECHNOLOGIES AUTOMOTIVE, INC.), 12 March 1998 (12.03.98) --	1-44
X	EP 1122633 A2 (BAYERISCHE MOTOREN WERKE AKTIENGESELLSCHAFT), 8 August 2001 (08.08.01) --	1-44
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 Further documents are listed in the continuation of Box C. See patent family annex.

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17 January 2003	22-01-2003
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. + 46 8 666 02 86	Authorized officer JAN SILFVERLING/BS Telephone No. + 46 8 782 25 00

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INTERNATIONAL SEARCH REPORT
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30/12/02

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